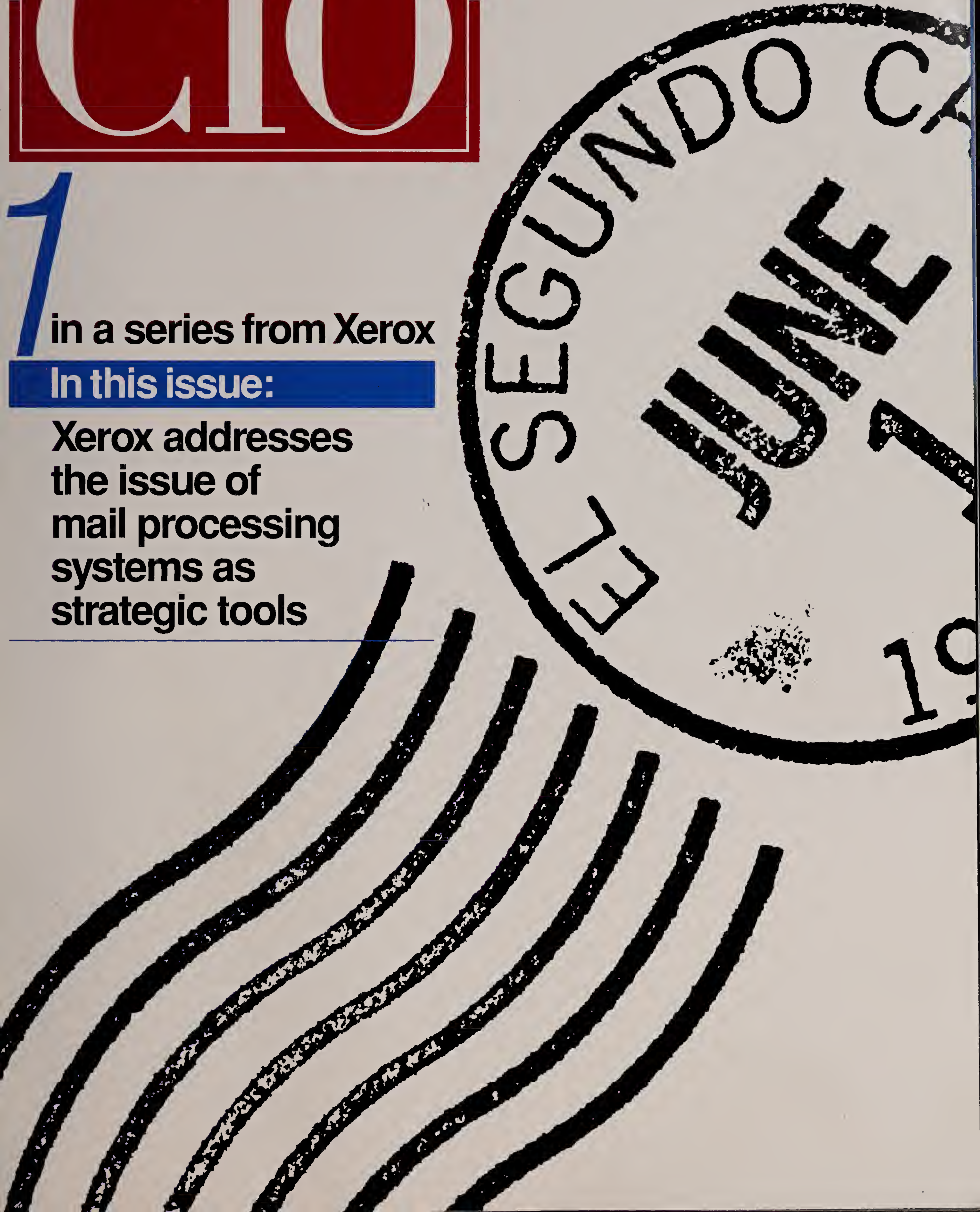
CIO

1 in a series from Xerox

In this issue:

Xerox addresses the issue of mail processing systems as strategic tools



Xerox Corporation
P.O. Box 24
Rochester, NY 14692

XEROX

Dear Colleague:

Some of the most inspired research and development of the 90's will come from outside the research lab. In fact, much of it will be found right in the work place. Truly brilliant innovations shall come from re-thinking that which we presently take for granted. With a fresh perspective, we can then re-engineer the process so both the customer and the bottom line benefit.

Let's look at the process of outgoing business mail, for example. After the document is completed, it usually goes through a series of isolated phases before it is finally delivered to the customer. If the entire process were streamlined and compatible with previously purchased equipment, significant savings could be achieved. You could simultaneously reduce overhead as well as response time to your customer.

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Turn to the back cover for a more in-depth view on the subject. And look for the advantages of bringing near-offset quality printing in-house, in an upcoming issue of CIO Magazine.

Yours truly,

Gary W. Mardorf

Gary W. Mardorf
Vice President
Printing Systems Customer Marketing

JUNE 1991
VOLUME FOUR NUMBER NINE
SEVEN DOLLARS

CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

COVER STORY:

Airline IT Takes Wing

National Car Rental's Steering Committee

America West Airlines' Carl Faulkner

AN INTERNATIONAL DATA GROUP PUBLICATION

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CIO

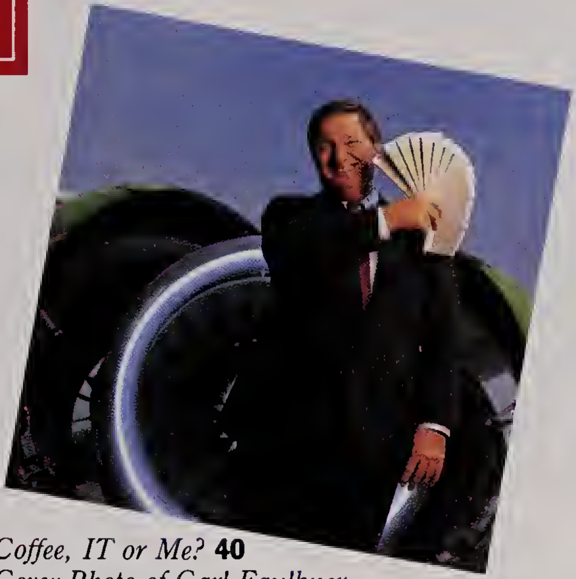
VOLUME 4, NUMBER 9

COVER STORY

Airport '91 40

The redoubtable CRS may be the runway on which airline IT taxis, but carriers are increasingly revving up nimble distributed systems for a wide body of applications.

By Meghan O'Leary



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Information management's best and brightest get their moment in the spotlight.

By Jason S. Casey

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The partnership of National Car Rental's IT-savvy CEO and business-savvy CIO has produced a wealth of innovations that are helping the company compete in a cutthroat industry.

By Dan Richman

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As the preeminent prophet of information technology, John Diebold combines futuristic vision with a pragmatic sense of where business opportunities lie.

By Thomas Kiely

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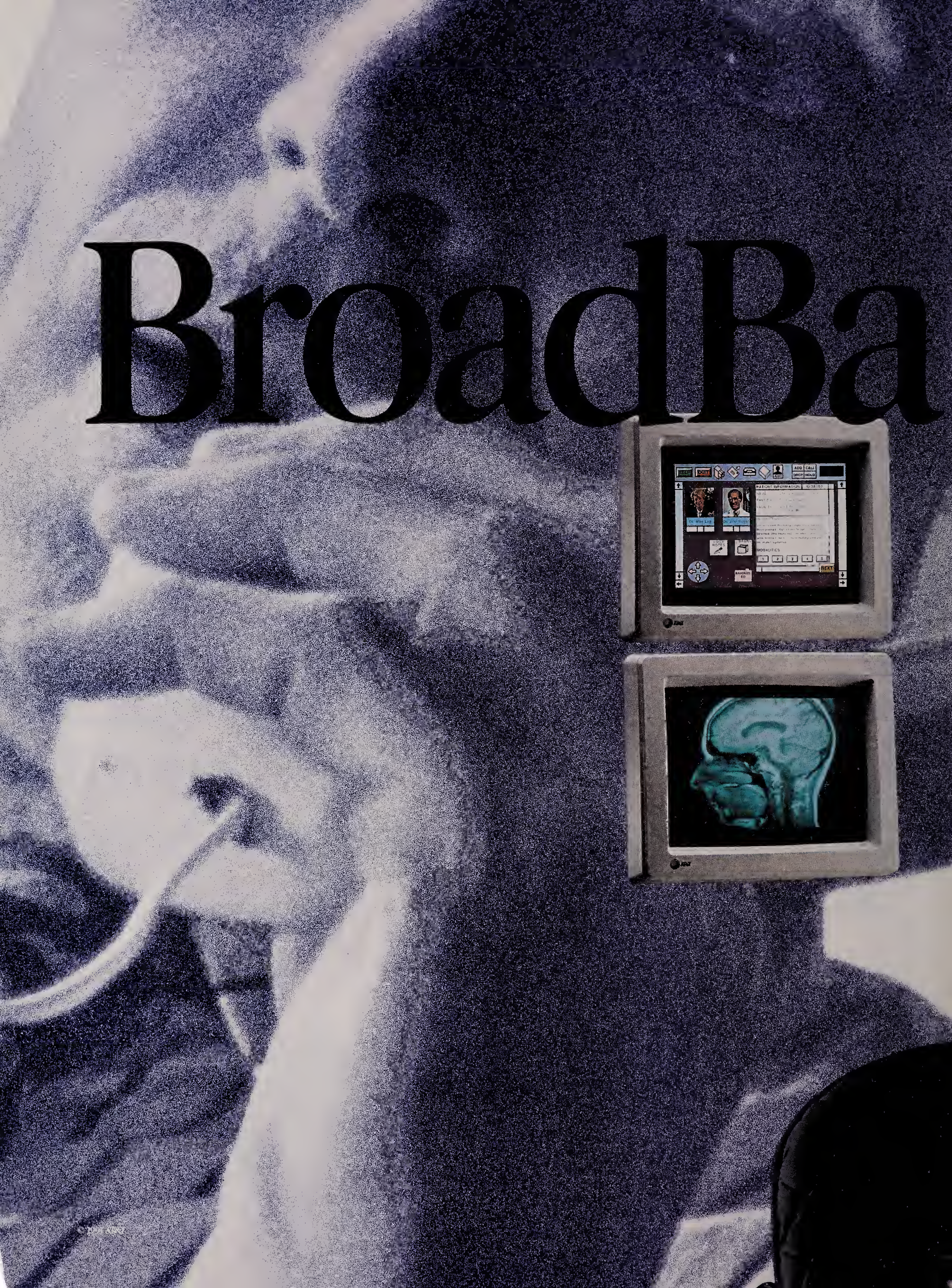
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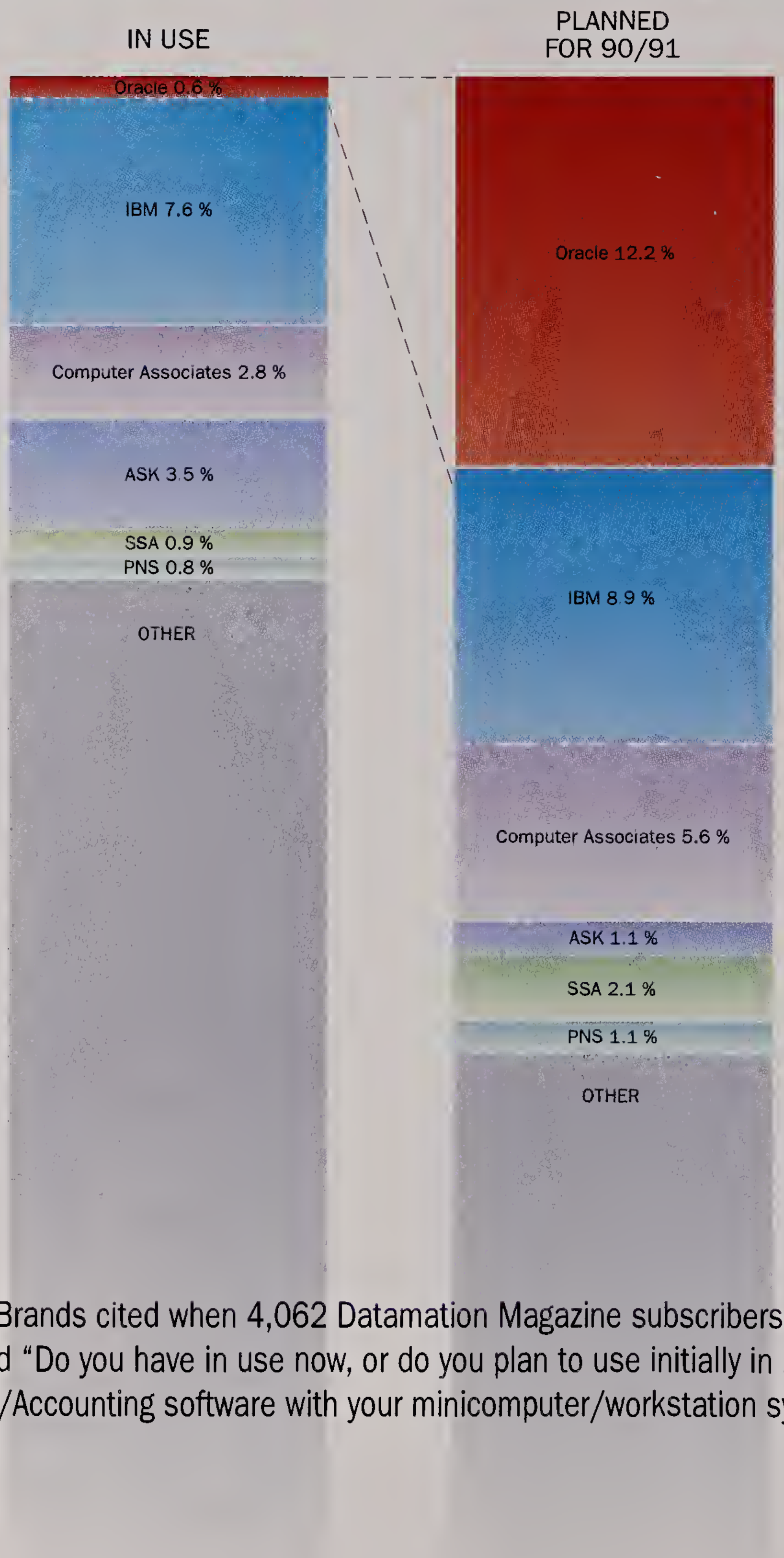

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By Kathleen Melymuka

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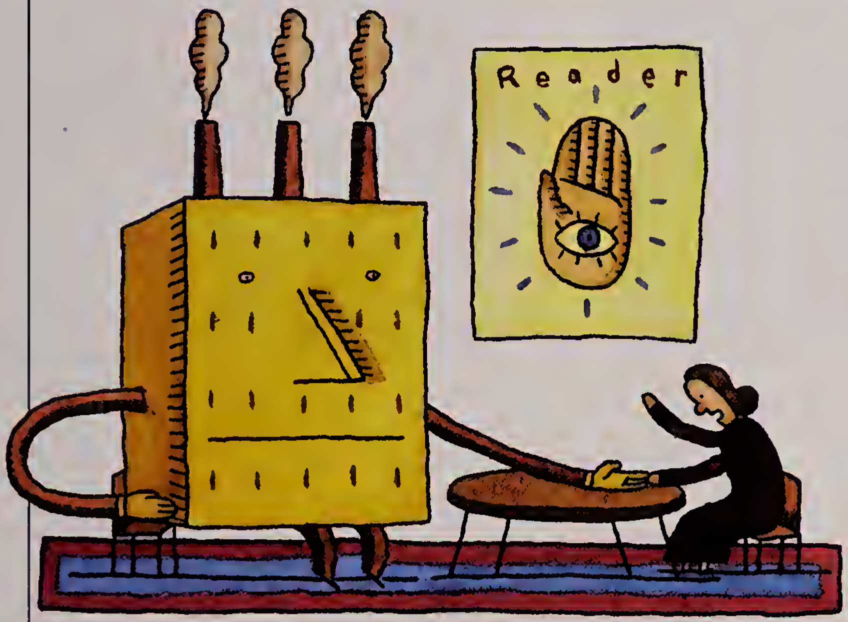

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unprecedented quality, prod

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David V. Evans
Vice President
Director, Information Systems
J.C. Penney

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Mark Quinlan
Senior Programmer/Analyst
Huntington National Bank

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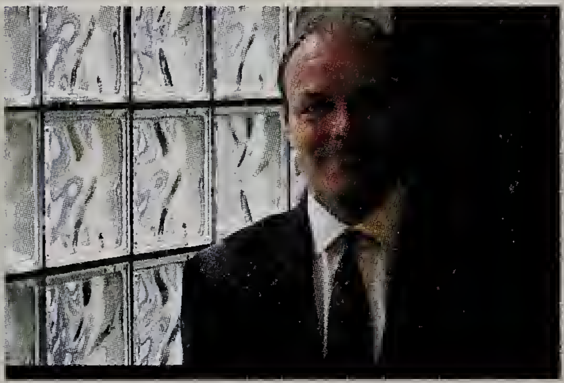
John Pajak
Executive Vice President
Mass Mutual Life Insurance

"The strengths of the IEF are clear-cut. One obvious quality advantage is that application changes are made to diagrams, not code. This ensures ongoing integrity —the specification always matches the executing system."

Paul R. Hessinger
Chief Technology Officer
Computer Task Group

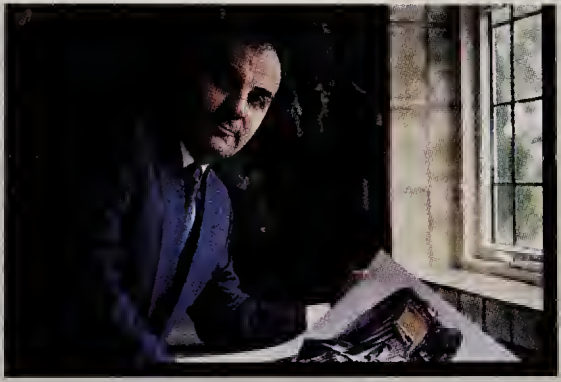


"I've seen other CASE tools fail, so I raised the bar high when we evaluated the IEF. It passed with flying colors. I could not be happier with my decision to adopt the IEF company-wide."

John F. Mott
President
AMR Travel Services

"Our users were extremely pleased when we finished our first project—a 60-transaction system—in one-half the budgeted time. We had tried interfaced CASE tools without success. IEF integration makes the difference."

Giorgio Sorani
Division Head – MIS
Lubrizol



"We are using the IEF to develop a new generation of manufacturing systems replacing over 300 existing systems. We estimate that IEF will increase our productivity by between 2-to-1 and 3-to-1 for new systems development.."

Wal Budzynski
Head of Operations, Systems/Computing
Rolls-Royce

"We used the IEF to rebuild our aging Frequent Flight Bonus system. With DB2 tables of up to 52 million rows, we needed high performance. And we got it...98% of our transactions complete in less than 3 seconds."

Cloene Goldsborough
Director of Data Resource Management
TWA

"Our first IEF system was completed faster, and with fewer errors, than any system I've ever seen. If I had to go back to the old ways, I'd find another job...outside the DP world. It means that much to me."

Mogens Sorensen
Chief Consultant
Nykredit (Denmark)

op information systems with uctivity and maintainability.

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Major companies have used TI's CASE product, the Information Engineering Facility™ (IEF™), for everything from rebuilding aging high-maintenance-cost systems to development of new enterprise-wide strategic systems.

Study shows zero code defects.

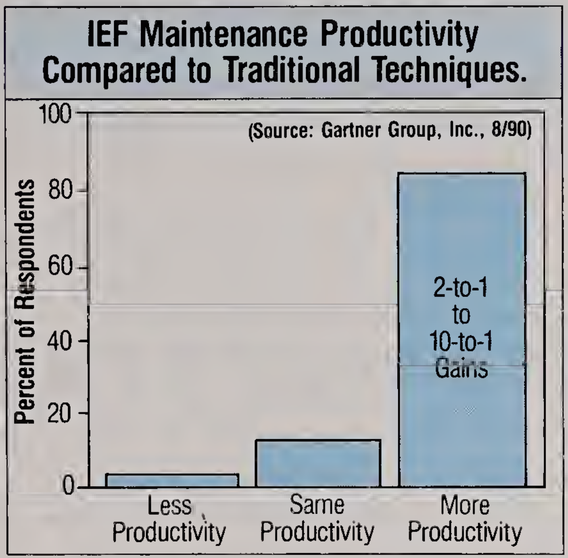
The quality of IEF-developed systems is remarkable. In recent CASE research by The Gartner Group, application developers were asked to report the number of abends they had experienced. (An "abend" is a system failure or "lock-up" caused by code defects.) *IEF developers reported zero defects—not one abend had occurred in IEF-generated code.*

Maintenance productivity gains of up to 10-to-1.

In this same study, developers were asked to compare IEF maintenance productivity with their former methods. Of those responding, *more than 80 percent had experienced gains of from 2-to-1 to 10-to-1.* (See chart.)

Specifications always match the executing application.

With the IEF, application changes are made to diagrams, not code. So, for the life of your system, specifications will always match the executing application. The Gartner Group research showed that *all* IEF users who reported making application changes made *all* changes at the diagram level.



Developers were asked to compare IEF maintenance to former methods. Of those responding, more than 80% reported productivity gains of from 2-to-1 to 10-to-1.

Mainframe applications can be developed and tested on a PC.

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We are committed to standards.

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66106

Summer is fast approaching: Time to make those vacation plans. Whether you intend to travel by train, plane or automobile, chances are information technology influences your mobility.

This month *CIO* looks at how the airline industry, one of the earliest proponents of IT for competitive advantage, is rethinking and elaborating upon its existing systems. Senior Writer Meghan O'Leary, in our story "Airport '91" (beginning on Page 40), describes how the airlines' central reservation systems have become mature commodities. But airlines are adding onto their CRSs by writing applications that, among other things, emphasize customer service—from finding seats for late-booking business travelers to providing travel agents with more flexible products. Many of these enhancements are being accomplished through applications written on distributed networks.

Once on the ground, many travelers find themselves at the counters of rental-car companies. At National Car Rental the alliance between CEO Vincent A. Wasik and CIO John D. Livingston puts an emphasis on using information systems to control operations—the company plans to cut operating costs by 25 to 30 percent over the next few years by increasing automation. At the same time Wasik and Livingston are implementing new marketing and customer service programs, such as Emerald Aisle and Smart Key, that are heavily supported by IT. In "National's Steering Committee," on Page 74, freelance writer Dan Richman chronicles their endeavors.

The pervasiveness of information systems within enterprises is raising some difficult questions in the law enforcement and legislative communities about how to ensure that the use of information does not violate essential rights. *CIO* freelancer Alice LaPlante listened to a bevy of legal and intellectual heavy hitters address this topic at a recent conference on "Computers, Freedom and Privacy." Our "Insights" column on Page 24 begins with the concept of "cyberspace," a sort of Twilight Zone populated by computers that know no temporal or geographic boundaries and within which are stored immense amounts of information that can be manipulated, transmitted and distributed in any number of ways. In this context, opportunities for abuse are rife. Employers are monitoring employees' productivity by measuring keystrokes and tapping into E-mail correspondence. Companies are selling the data they gather on customers, without their permission to do so.

Faced with such situations, those trying to define the boundaries between automation and privacy are beginning to question whether existing laws adequately regulate cyberspace, or whether new laws or even a constitutional amendment are needed. With businesses under increasing scrutiny for ethical behavior, the CIO must develop a keen awareness of the impact of information technology, not only in the corporate culture, but in the world at large.

Marcia Blumenthal

PHOTO BY WEBB CHAPPELL

CIO

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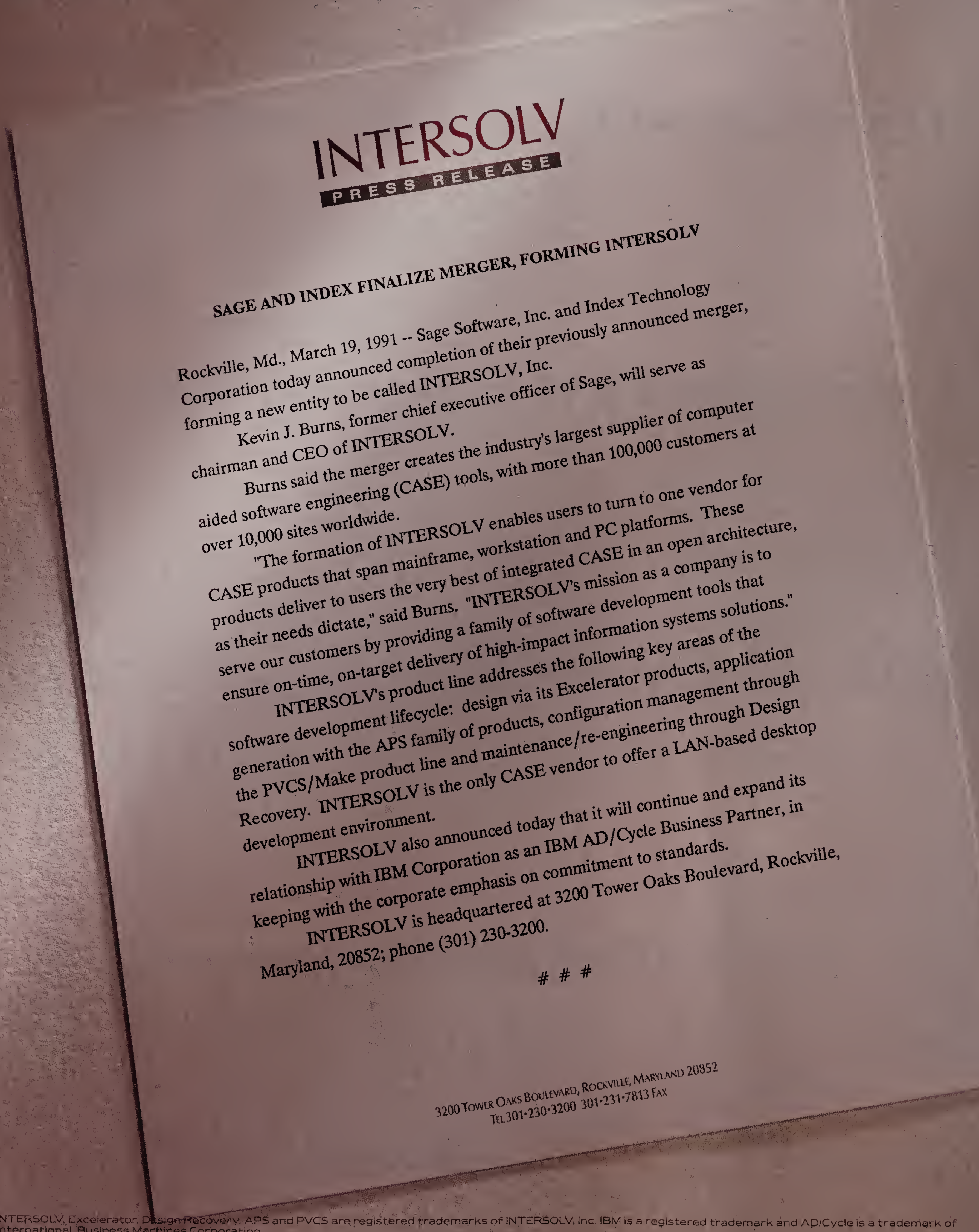

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PRESS RELEASE

SAGE AND INDEX FINALIZE MERGER, FORMING INTERSOLV

Rockville, Md., March 19, 1991 -- Sage Software, Inc. and Index Technology Corporation today announced completion of their previously announced merger, forming a new entity to be called INTERSOLV, Inc.

Kevin J. Burns, former chief executive officer of Sage, will serve as chairman and CEO of INTERSOLV.

Burns said the merger creates the industry's largest supplier of computer aided software engineering (CASE) tools, with more than 100,000 customers at over 10,000 sites worldwide.

"The formation of INTERSOLV enables users to turn to one vendor for CASE products that span mainframe, workstation and PC platforms. These products deliver to users the very best of integrated CASE in an open architecture, as their needs dictate," said Burns. "INTERSOLV's mission as a company is to serve our customers by providing a family of software development tools that ensure on-time, on-target delivery of high-impact information systems solutions."

INTERSOLV's product line addresses the following key areas of the software development lifecycle: design via its Excelerator products, application generation with the APS family of products, configuration management through the PVCS/Make product line and maintenance/re-engineering through Design Recovery. INTERSOLV is the only CASE vendor to offer a LAN-based desktop development environment.

INTERSOLV also announced today that it will continue and expand its relationship with IBM Corporation as an IBM AD/Cycle Business Partner, in keeping with the corporate emphasis on commitment to standards.

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The merger of Sage Software and Index Technology does far more than just bring together two strong CASE companies. It allows two companies with complementary strengths to focus on a common vision. A vision of where the market must go to fulfill the promise of CASE.

At INTERSOLV, our combined 17 years of CASE experience has taught us that you can't build applications in a hyperintegrated and closed environment. We have a unique solution: the benefits of I-CASE, but with a modular implementation approach that reduces up-front costs and risks.

Our solution takes into account the true realities of the 1990's development environment—development cycles, methodologies, how developers really work, and existing cultures.

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Just as important, we're the only CASE vendor to offer solutions that support a true multi-user development environment using workstations and LAN server technology.

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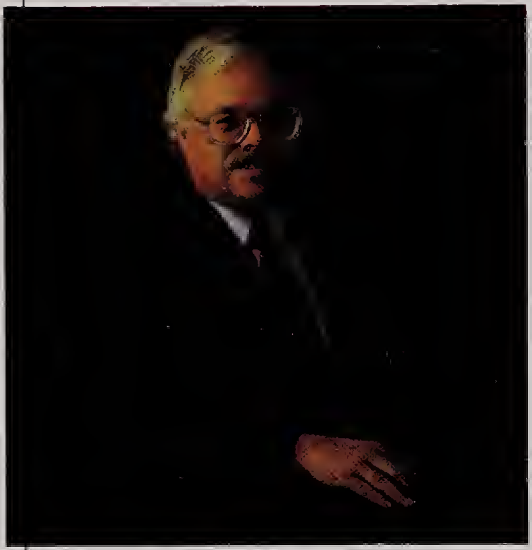


A critical issue is threatening America's competitiveness. It's not the Japanese. It's not lack of quality. It's workforce literacy. And it's an issue that must be addressed by business and educators if we are to prosper throughout the next century.

Studies indicate that the skill level of the entire U.S. labor pool is declining steadily. Our high school dropout rate averages 30 percent in major cities. College completion is declining: Only 50 percent of the students who enter college actually graduate. In addition, many senior workers are retiring, taking with them years of experience and leaving few behind to provide "apprenticeship" training for younger workers.

The nature of American business is changing as well. Repetitive skills are valued less in this new service economy that places importance on analytical and communication skills. And information technology is creating demands for different types of skills needed in factory automation, process control and management. Most of today's workers simply aren't prepared to meet these challenges, and it's affecting everybody's bottom line.

I learned about the seriousness of this crisis from Mike Behar, CEO of University Communications, a firm that provides IT training and education services (and is a licensee of the University of Illinois). Like Mike, I believe it's time to stop pointing fingers and instead form alliances between business and education.

CIOs can play a pivotal role in building strategies to improve this situation. They can work with human resource and other senior managers to identify training needs and control the use of new training technologies like laser videodisc and CD ROM. They can also champion programs that reach out to schools and universities to help tomorrow's workers gain the skills needed for success in business.

I look forward to exploring these and other strategies with you at the next Perspectives Conference, "IT and the Corporate Agenda: People, Productivity and Profit," Sept. 22-25, at the Hyatt Regency in Monterey, Calif.

PHOTO BY GEORGE SIMIAN

Coming In CIO

The CIO-100: Delivering Quality

Each year, *CIO* bases the selection of its CIO-100 on a different criterion. In this way, we seek to explore some of the more interesting and relevant business issues of the day. Our focus this year is on quality and how IT helps companies to achieve it.

Bridging the IS-End User Gap

Whether by clever adaptation, persistent outreach or sweeping reform, systems developers and user departments work to span the gap between them.

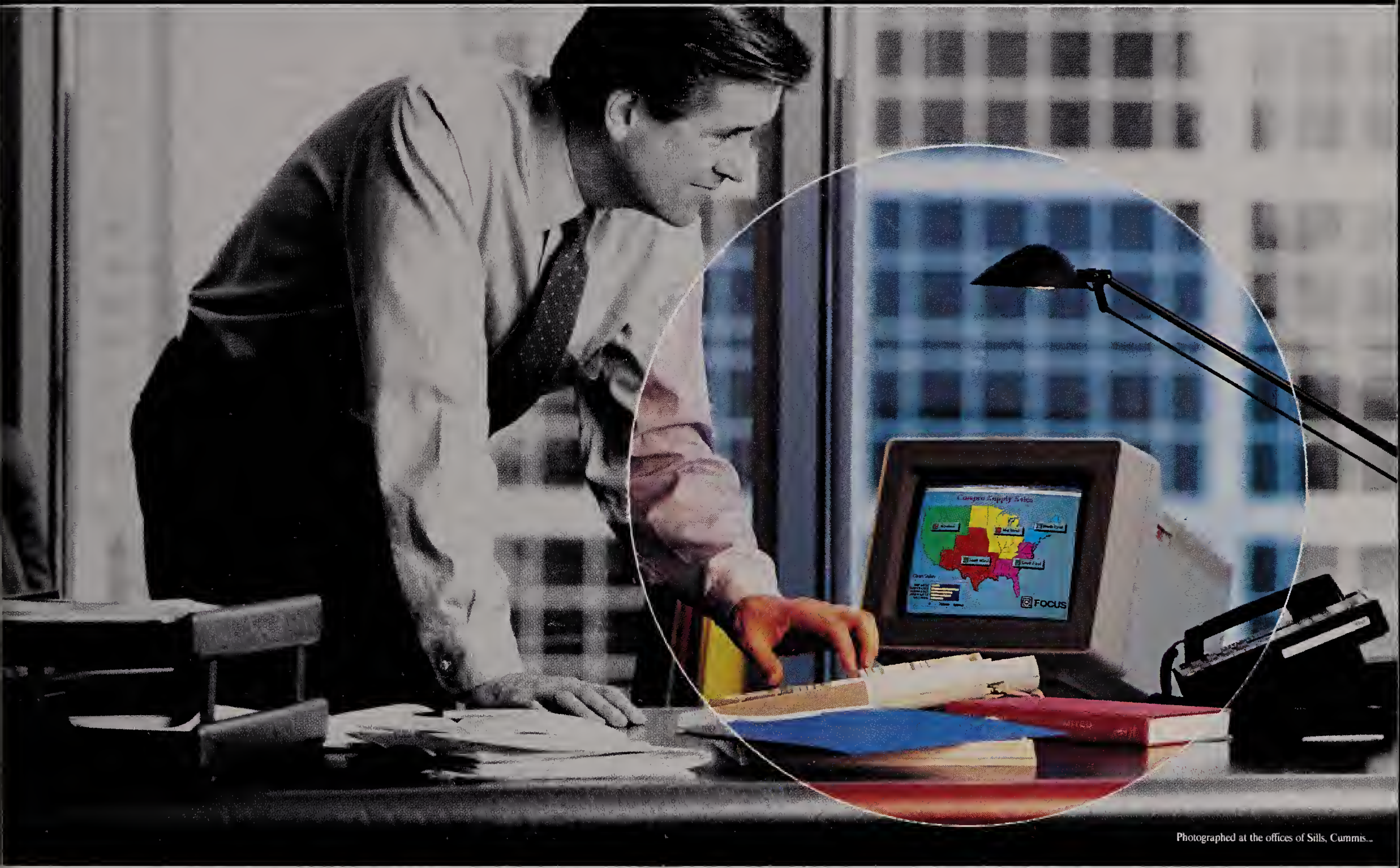
The Conundrum of the IS Mission

IS is supposed to give users what they want, yet many users do not know (or cannot articulate) what that is. Worse, users may *think* they know what can help without understanding the limitations of the technologies involved.

The Myth of Strategic IS

There is a growing consensus among IT observers that the notion of obtaining strategic advantage directly through an information system is obsolete—if it was ever valid to begin with.

If you have the need to know, but still can't access the data...



Photographed at the offices of Sills, Cummis...

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FOCUS, the world's leading 4GL, accesses over 40 different database and file types on 30 different platforms. That's why more than 800,000 people worldwide have chosen to use FOCUS in their multi-data environments.

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TRENDLINES

HAND-HOLDING

SIGN RIGHT THERE NEXT TO THE CURSOR . . .

United Parcel Service, which is renowned for the time-and-motion expertise that led it to prescribe the number and kind of specific movements with which a driver should exit his or her delivery van, is subtracting some of the movements related to paperwork. UPS, of Greenwich, Conn., will equip its 65,000 drivers with hand-held computers that capture all delivery and pickup information, including recipient signatures.

The computer, called DIAD (delivery information acquisition device), is an 11-by-14-inch unit that weighs in at under three pounds, according to UPS spokesman Ken Sternad. It's been under development since 1982, a gestation that Sternad said owes its length to UPS's insistence on combining conventional hand-held technology with the pen-input capability that enables signatures to be captured. "The overwhelming preference of our customers is to have recorded proof of delivery," he said.

In practice the units are picked up by drivers at the start of each day having already been programmed with stop-by-stop route information. As each parcel is delivered and signed for, information on the next delivery appears. At the end of the day the DIADs are returned to a rack in which captured data is uploaded to a central computer and the units are recharged.

According to Sternad, driver response to the units has been enthusiastic. "We have very low turnover among drivers," he said, "so a lot of them have been with the company a long, long time and are used to doing things a certain way." Moreover, DIAD is the drivers' first dose of onboard technology. Despite this, Sternad said, the learning curve has been short—two hours of classroom time and a couple of days of supervised on-the-job use. By the end of the year, DIADs will be in the hands of 50,000 drivers; by mid-1992 all 65,000 UPS drivers will have the hand-helds.

In 1990 UPS delivered 2.9 billion parcels and documents, generating $13.6 billion in revenues. The DIAD program represents a $350 million investment. The system was developed and designed by two UPS subsidiaries, Roadnet Technologies Inc. and II Morrow Inc. The computers are manufactured by Inforite, based in San Mateo, Calif. ■

UPS *brings computing to the customer's doorstep.*

MONEY ISN'T EVERYTHING

IS employers strapped for cash can motivate employees in other ways, according to Source Edp, a recruitment firm based in Irving, Texas, that specializes in the placement of computer professionals. The company suggests a number of alternatives to raises:

- **Publish letters of commendation in the company newsletter or post them on bulletin boards. This will boost morale.**
- **Hold periodic staff meetings in which employees can voice concerns and be informed of company plans. This will increase their sense of having a real stake in the fortunes of the organization and motivate them to work harder to achieve its goals.**
- **Conduct regular performance appraisals. This provides employees with recognition and feedback and helps them to view constructive criticism in a positive light.**

Creative managers, according to the recruiter, will be able to hold onto good people until the economic situation improves. ■

NEW IDEAS

The International Center for Information Technologies (ICIT) in Washington has announced the winners of its Doctoral Award. They are François Bar of the University of California at Berkeley for his dissertation "Configuring the Telecommunications Infrastructure for the Computer Age: The Economics of Network Control"; Jane C. Linder of Harvard University for "Integrating Organizations: Where Information Technology Matters"; and Alain Pinsonneault of the University of California at Irvine for "The Impact of Information Technology on the Middle Management Workforce: An Empirical Investigation."

ICIT sponsors this annual competition for doctoral dissertations to promote useful academic research in the IS field. Entries are judged on originality, relevance and quality. Winners receive $5,000. They also qualify for a publishing contract with the ICIT Press.

The entry deadline for the 1990/91 award is July 1. For more information, call 202 337-2688. ■

PHOTO COURTESY UNITED POSTAL SERVICE. ILLUSTRATION BY DIANNE BENNETT

TRENDLINES

NEW VENTURES

Business reengineering is the focus of a new education and research program: The Center for Reengineering Leadership, in Cambridge, Mass., a joint effort of The Index Group and consultant Michael Hammer. Index Group Vice President Steven A. Stanton is director. The center's purpose is to increase and spread knowledge about how to reengineer business processes. It will attempt to determine the best practices and then teach them through its educational programs. The center's researchers will examine which technologies have the greatest impact on reengineering, and look at the CIO's role. The center's first effort will be a multicompany research program.

Digital Equipment Corp., of Maynard, Mass., has inked a strategic development pact with MasPar Computer Corp., of Sunnyvale, Calif., a maker of massively parallel computer systems and supporting software. The deal, which also includes DEC's purchase of an unspecified minority interest in MasPar, will bring DEC into the emerging market for massively parallel systems. Under terms of the development deal, DEC will market MasPar computers worldwide; in addition, MasPar will pay DEC a licensing fee to incorporate proprietary Digital technology in its computers. Digital has also established a new business unit to work with MasPar and other companies to develop software tools and applications for use in massively parallel systems.

PERFORMANCE MEASUREMENT

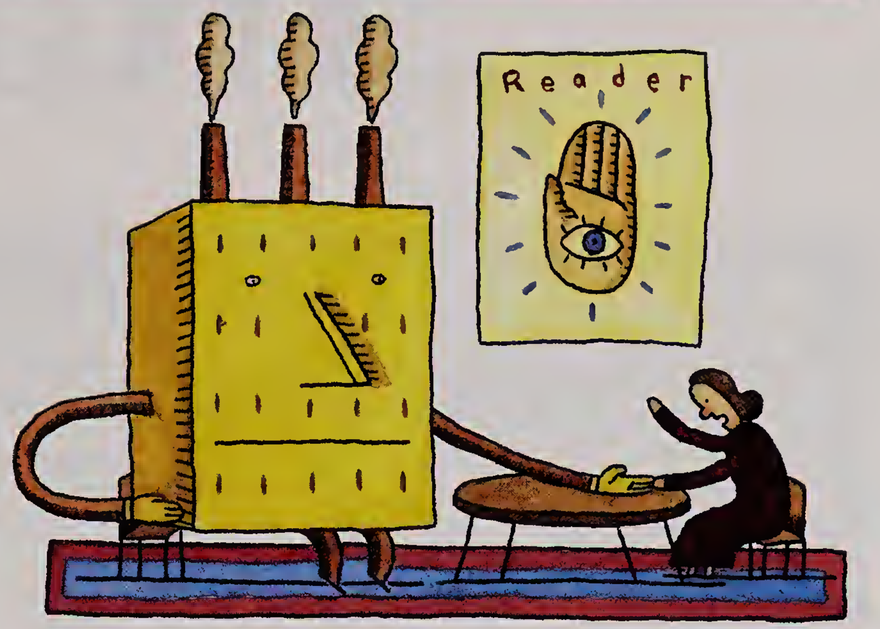


ILLUSTRATION BY JAMES KACZMAN

CHANGING THE RULES

Imagine two 30-year-old millionaires. One made her fortune by building a company from scratch; the other inherited it from a wealthy uncle. Which do you think will be more financially successful 10 years from now?

Of course there's no way to know for sure. But when it comes to projecting future success, what you have is frequently less important than how you got it. That's the reasoning behind a new approach to measuring corporate performance designed by the Nolan Norton Institute, experts from academia and senior executives from General Electric, duPont, Apple Computer and Hewlett-Packard. The new measurement system redefines profitability by focusing on indicators of future success rather than past performance.

Several Fortune 500 companies are investing millions of dollars in the effort "because current systems are obsolete," according to Winnie R. Rogow, principal and director of research for Nolan Norton, a research organization of KPMG Peat Marwick. "The factors driving value in companies today are quality, service, cycle time, innovation and continuous improvement. So the organization of the future must measure not only financial value itself but also the elements that create that value."

Instead of concentrating on "lagging indicators" such as ROI and earnings per share, the new system looks at "leading indicators" in four categories: customer perspective, business processes, financial perspective and organizational learning. Companies use a scorecard to measure such indicators as customer satisfaction, on-time delivery, development cost, time to market, profitability per employee and percent sales from products less than one year old. The measures are expressed as corporate goals and objectives linked to the organizations' vision and strategy.

The procedure for developing the scorecard is flexible enough that existing measures can be replaced when problems are solved or the competitive ground rules change. And Nolan Norton suggests that the program be supported by accountability/reward structures that empower employees to make decisions based on the measurements.

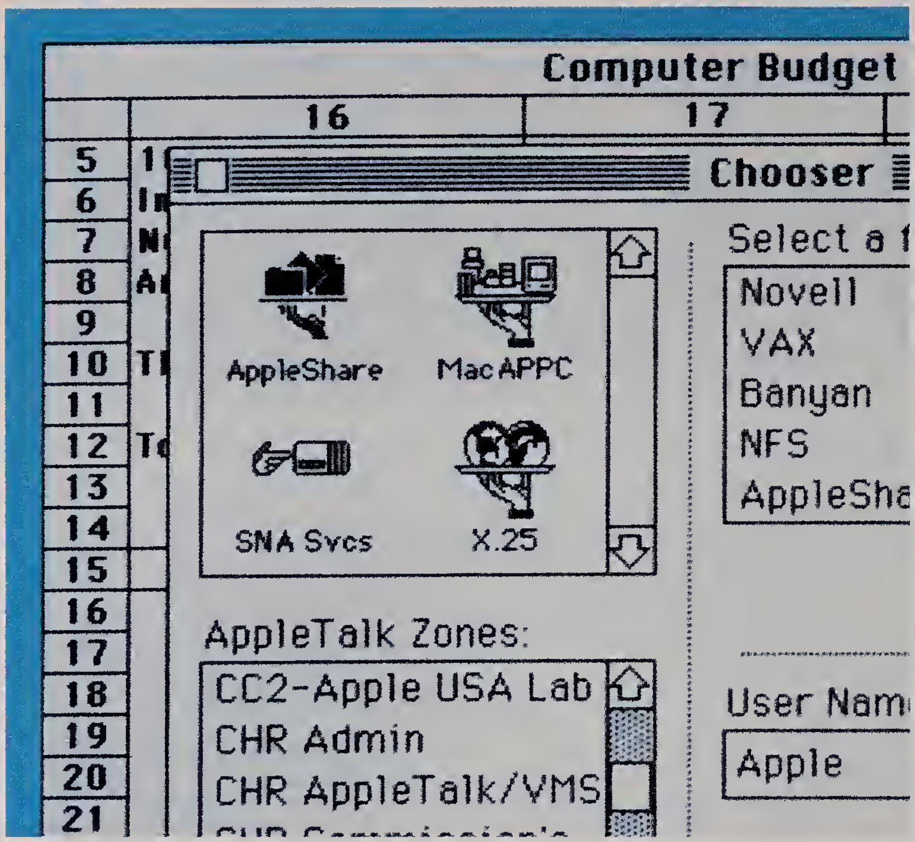
Nolan Norton is also building a benchmark database.

THE BEST OF BOTH WORLDS

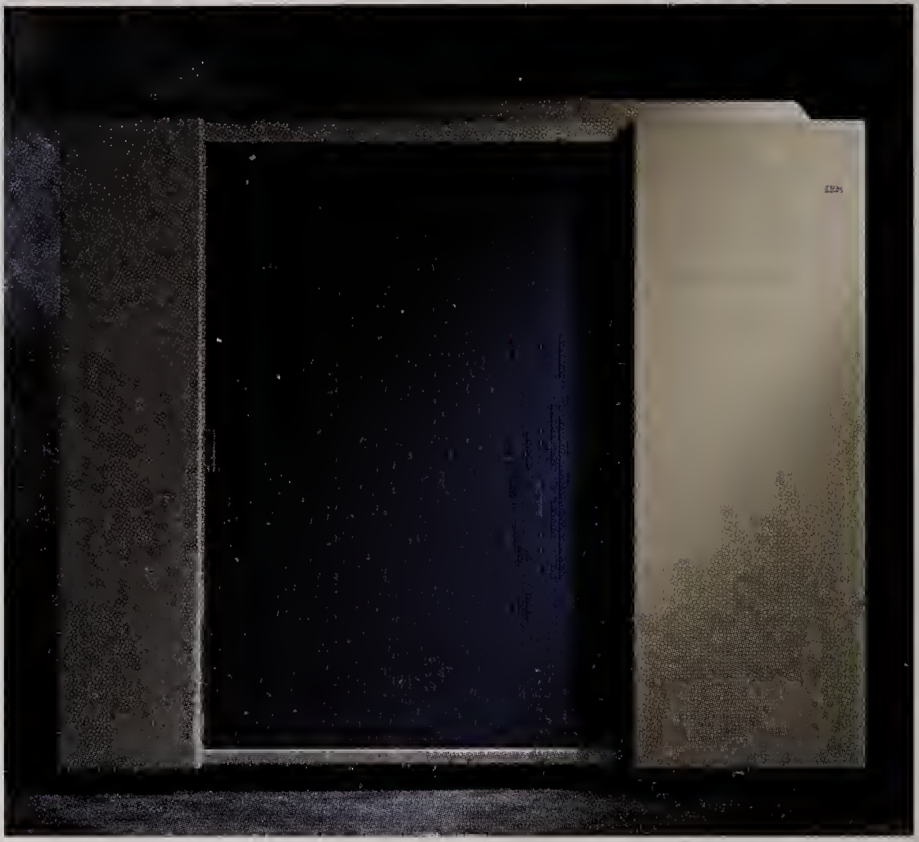
The speed and flexibility promised by object-oriented programming and client/server computing may lead to a fitting new form of software known as "hybrid-ware," according to a report from Forrester Research Inc. "The New Software Agenda" predicts that hybrid-ware will incorporate the personalization and ease of use of PC software and the power and standards offered by centralized administrative software. The resulting package will offer easy access to information through customizable front ends and flexibility across a corporate network. Based on object-oriented programming, the systems will be easily adapted to changing networks or market needs. "Centrally developed [systems] run companies," said George F. Colony, author of the report. "They feature unparalleled power but are despised by users for their Byzantine complexity. End-user systems improve the productivity of white collar workers, but have little or no impact on how companies work. What is needed are new systems which go both ways—they are loved by end users and have the richness to have a direct impact on the operations of large companies."

Hybrid-ware will not replace centralized systems or PC systems. Rather, it will provide a link between the two with access to corporate data, and within the confines of corporate data rules.

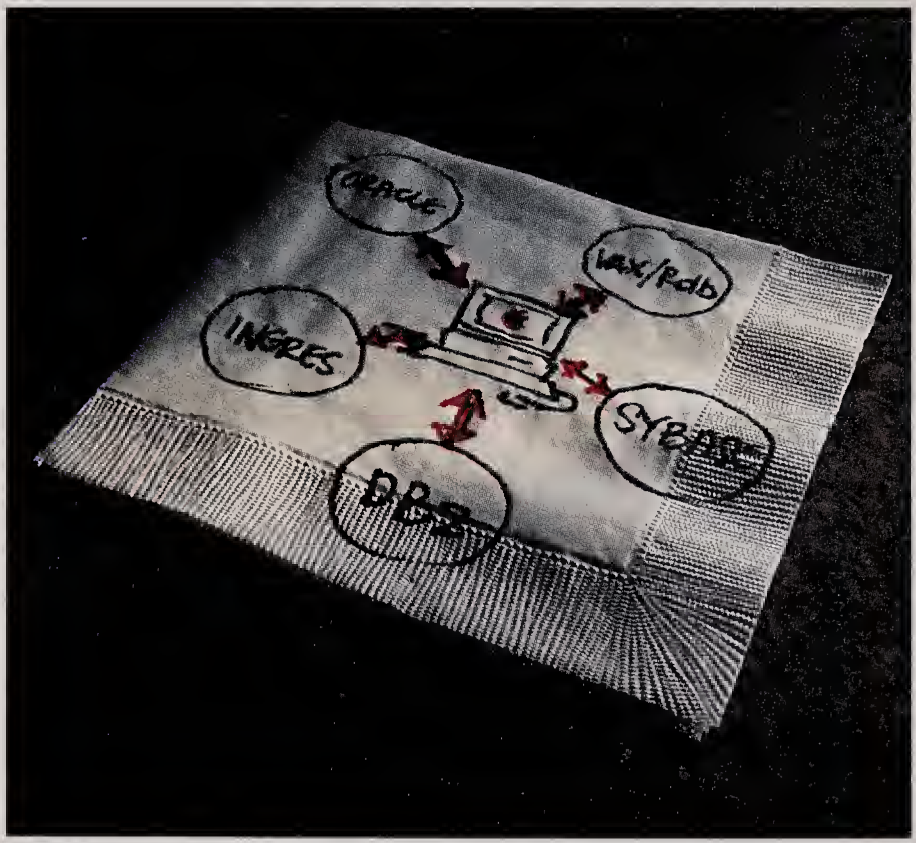
We're open



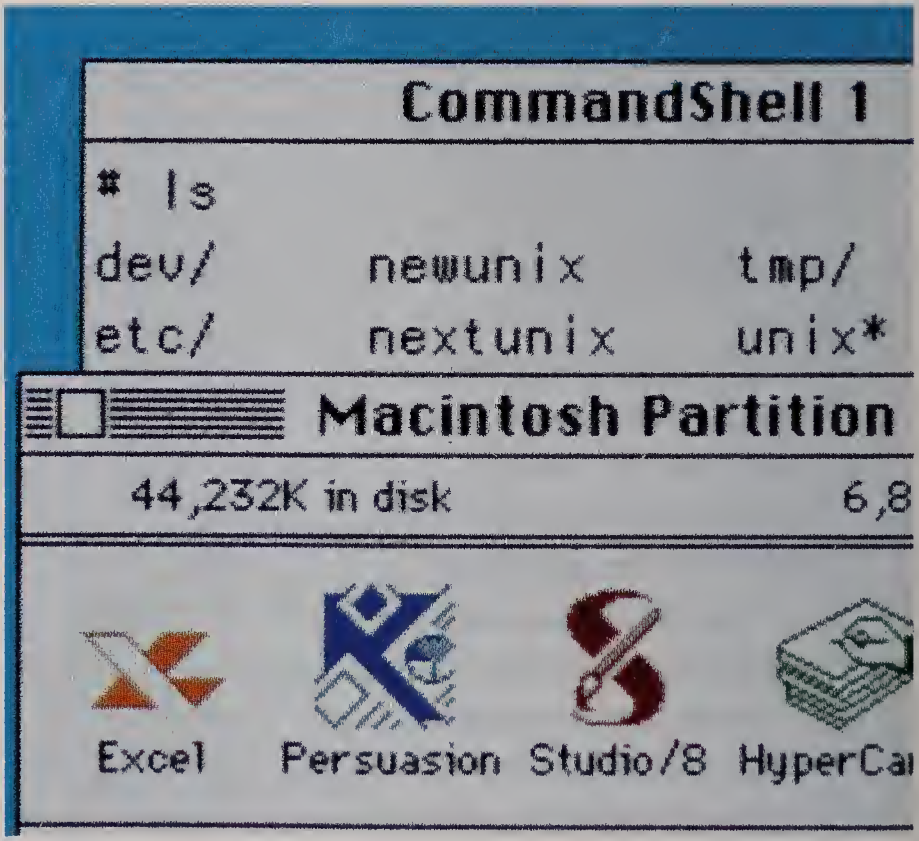
This is the Macintosh Chooser. A single point of access to a wide range of systems. The Chooser shows available network resources graphically and consistently. Just point the mouse and you're connected.



Macintosh offers an incredible range of tools for connecting with virtually any host-based environment, whether it's running SNA, TCP/IP, DECnet™, or OSI.



Apple's Data Access Language (DAL) adapts popular off-the-shelf database, spreadsheet, and data analysis software to major SQL environments. So nontechnical users can easily access remote databases.



```
# ls
dev/        newunix     tmp/
etc/        nextunix    unix*
```

Apple A/UX® lets Macintosh run UNIX® applications plus thousands of Mac® programs. At the same time you can run X-Window and MS-DOS applications, and cut, copy, and paste between any of them. No other desktop computer can do this.

to anything.

Macintosh shares data with DOS PCs via Novell, 3Com, Banyan, and more. Macintosh reads and writes DOS files on a floppy disk. Macintosh runs DOS programs. Maybe your next DOS computer should be a Macintosh.

While diversity may make life rich and fascinating, it makes life as an IS manager something short of serene.

What is politely referred to as the "multi-vendor environment" is an amalgam of disparate hardware, incompatible operating systems, dissimilar databases, and multiple networks. Nevertheless, IS people are expected to make these all work together in perfect harmony.

But lately, a lot of people are finding the source of their solution a pleasant surprise: the Apple® Macintosh® computer.

They're finding that Macintosh comes out of the box with sophisticated networking capabilities designed right in.

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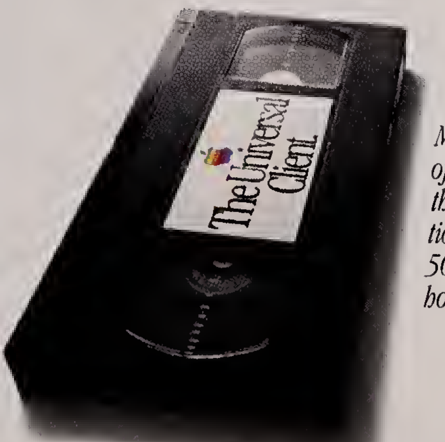
And because Macintosh works with all your networks, databases, and hosts in one consistent and graphic way, it delivers major savings in implementation and training.

In short, Macintosh gives you the power to make information systems more valuable to the people who use them. The power to be your best.®

Information isn't much good to people who can't get to it. Macintosh sorts out the complexities of multiple computer systems and presents vast information to people at the desktop in a single, consistent way.



Macintosh gives people a single, simple view of the information and services that can help them do their jobs and serve your organization. See for yourself. Call 800-635-9550, ext. 501, and we'll send you a free video showing how Macintosh helps unify complex systems.

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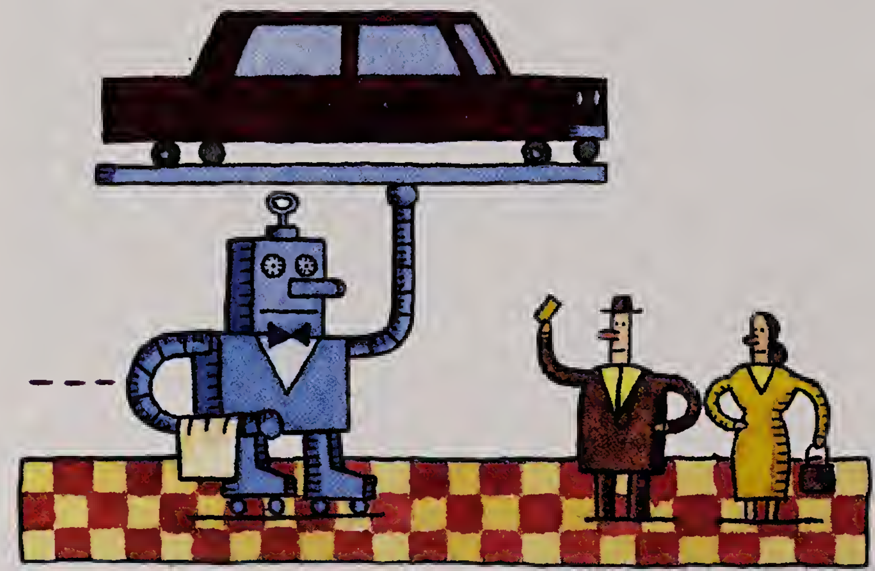
TRENDLINES

AUTOMATION

MAKING THE MOST OF A LOT

Joni Mitchell was wrong: Paradise and parking lots are not mutually exclusive.

It may be hyperbole to call the new automated parking garage being built in Barcelona, Spain, paradise. But it sounds like heaven when you compare it to similar structures, where car owners wander from circle to shadowy circle in search of their vehicles. The new garage, a project of Camunsa Manutencion SA, a Barcelona-based industrial-automation company, promises to automatically deliver cars to their owners in less than two minutes. The garage will be unstaffed: All customers have to do is insert a ticket into a card reader.



The $25 million 10-story underground garage is designed to house 800 cars in the same space it would ordinarily take to accommodate 300. It does this by eliminating the space normally required for vehicles to maneuver in. Cars are stowed on moving palettes, like those used in warehouses, and G2, a real-time expert system from Gensym Corp. in Cambridge, Mass., makes intelligent decisions about their storage and retrieval. For example, the automobiles of subscription customers who use their cars frequently would be parked in the most accessible positions.

Six Pyramid Integrator programmable logic controllers from Allen-Bradley Co. of Milwaukee operate the elevators and conveyors that move the palettes. The controllers are connected to two 3100 DEC VAXstations running G2.

"It's a natural for big cities," said Robert Moore, president of Gensym. "Ever since this started I've been noticing in parking garages how much space is [wasted] just on maneuvering around. I think this will really open some eyes."

Camunsa wants its garage, the first of its kind in Europe, to be ready in time for the 1992 Summer Olympics.

BAT CONTEST WINNERS!

In our April issue we asked readers to help us interpret a press release announcing a "machine-vision system which verifies the installation of a thrust and a batwing washer on either side of a gear." Not-quite-an-avalanche of readers responded with admirable earnestness and perceptivity that did not quite dispel our mystification. Still, we are basically satisfied that any lingering confusion is our own damn fault, and not that of our excellent respondents.

Thanks to William A. Rolke, of Columbus, Ind., who not only explained that the "batwing washer is used to keep the thrust washer from riding against the case at the point where the gear axle enters either the case or, more often, a bearing"; he also made a telling point about the importance of precision in language by noting that "poppycock," the name of a brand of candied popcorn, originally meant "soft manure." A *CIO* mug to Mr. Rolke.

Thanks also to Bob Hammaker, of Springfield, Pa., who opened his letter "Dear Batperson" and (besides offering a serious explanation) asserted that the machine-vision system would verify whether bats had bathed (see illustration). On the theory that no display of wit, no matter how corny, should go unrewarded, a mug to Bob.

Randy Catloth, assistant chief of the Facilities Division of the Engineering Service of the U.S. Government Printing Office, earns a mug for offering valuable context on machine-vision systems generally as well as an eloquent description of batwing washers ("purposely deformed to take on a 'wavy' appearance") and a concise characterization of their *raison d'être* ("to apply radial pressure in mechanical assemblies").

Finally, to one anonymous entrant (he knows who he is), who sent in a patently absurd explanation and then pleaded with us not to divulge his name because "my boss might can me for wasting time," we propose to mug him for wasting ours.

BUSH BOSH

We credulously reported in an article on IT use in the White House ("All the President's Computers," *CIO,* June 1990) that President Bush is a "very hands-on, proactive user of technology" who uses the White House E-mail system and composes his own E-mail messages to staffers. The quote came from J. Bonnie Newman, who was then assistant to the president for management and administration—the de facto White House CIO—and has since moved on to the private sector. We don't know whether Newman was misinformed or was simply improving slightly upon presidential reality, but we recalled the "hands-on user" claim when the story recently broke that President Bush was losing his computer virginity to a very nice PC, with buttons and everything. Apparently so eager a pupil was he that he failed to wait for his PC tutor and went ahead and executed a few DOS commands. The free world trembles.

ILLUSTRATION LEFT BY JAMES KACZMAN; RIGHT BY DIANNE BENNETT

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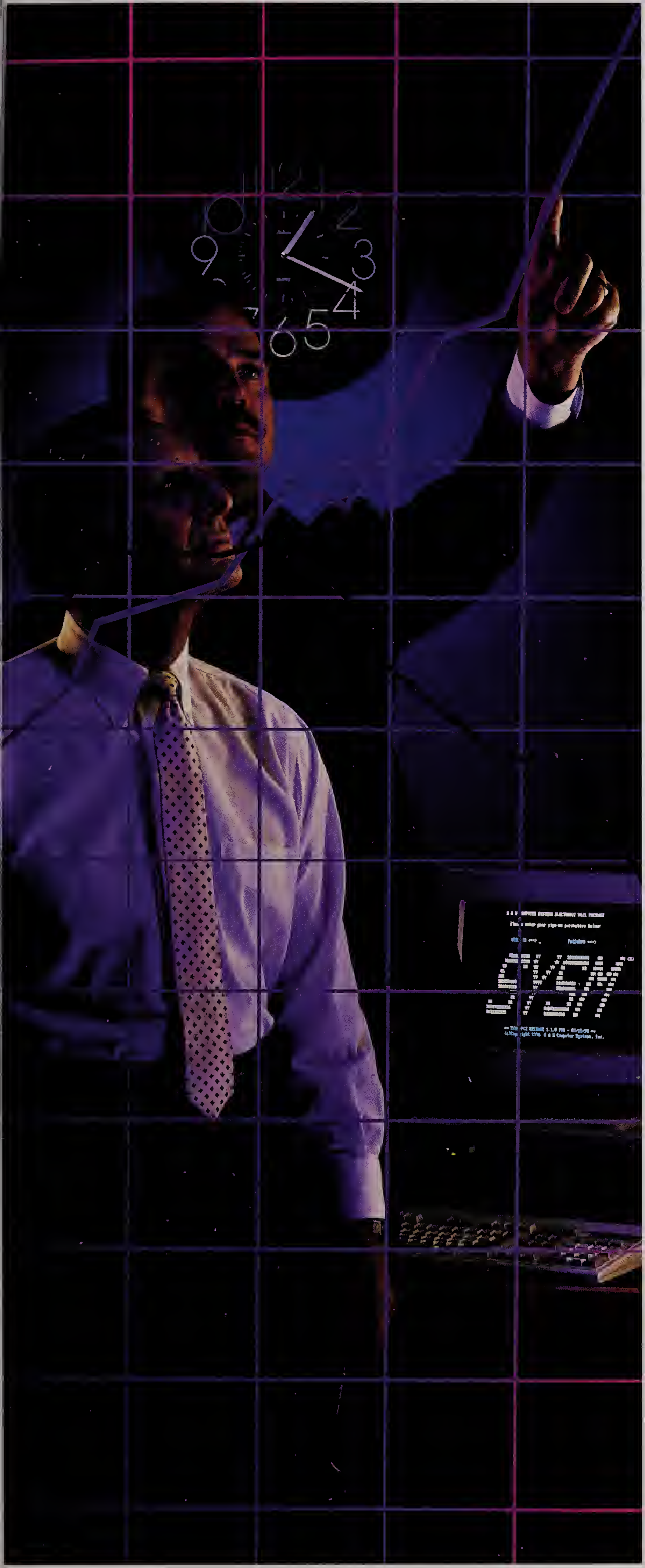

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TRENDLINES

GAMES PC OWNERS PLAY

A recent item in *The Wall Street Journal* notes a watershed of sorts: U.S. Census Bureau data reveals that 15 percent of American households now harbor at least one computer; in 1984 the percentage was 8.4.

But lest anyone get the idea that we're on the verge of an era of grass-roots number crunching and homework-doing, the Census Bureau reckons that most of the uptime on these PCs is spent by children—and adults—playing video games. Eighty-five percent of children with computers use them to play games; only 40 percent use them for schoolwork. Among adults, 62 percent use PCs for word processing, with the second-place application being game-playing (44 percent). ▬

CONFERENCE REPORT

ARTIFICIAL INTELLIGENCE —REAL RESULTS

To some, artificial intelligence is a neurological disorder common to politicians. To others it is the trigger finger of an exotic program used to guide the movements of a robot. But to the American Association of Artificial Intelligence, AI is a technology that can provide tangible help in solving business problems that have bedeviled traditional programming.

At its upcoming Innovative Applications in Artificial Intelligence Conference (to be held in Anaheim, Calif., July 15-17), about two dozen presenters will report on pragmatic AI-based applications in use at organizations as diverse as American Airlines, Nippon Steel and the California Health and Welfare Data Center.

The California solution is an expert system used to verify and process employee expense claims. Each year, about 200,000 golden state employees submit 400,000 claims for travel and business expenses. Reimbursement rules are complex and ever-changing, and error rates on processed claims have traditionally been high. Then in 1989, the Health and Welfare Data Center unveiled a knowledge-based system called CALTREC (California Travel Expense Claim System). An alloy of rule-based artificial intelligence and traditional data processing, CALTREC currently processes the expense claims of about 6,000 users in 12 Health and Welfare departments. The system's boosters say that errors and auditing time have been reduced.

Cognitive Systems, an AI company in New Haven, Conn., developed an intelligent letter-writing solution for a major (and unnamed) U.S. credit card organization. Heretofore, customer service representatives could select from among nearly 1,000 form letters. The reps typically used fewer than two dozen of these regularly, and simply customized them. But this was time-consuming—it could take the company from three days to two weeks to respond to an inquiry—and frequently the letters were poorly written.

Cognitive Systems claims that the automated scribe it installed in the big plastic-money company in late 1989 has improved the process. Using conventional expert system technology, the application helps customer reps to compose accurate letters and to get them in the mail faster.

Other presenters at the conference will describe systems used in mechanical design, maintenance scheduling, airline and banking operations, and steel production. ▬

STANDARDS FORUM

Fans of electronic bulletin boards take note: The National Institute of Standards and Technology, the same branch of the U.S. Commerce Department that hosts the Baldrige Awards, also operates four bulletin boards that could prove useful to IS managers. Their topics include computer security (301 948-5717), data management activities and applications (301 948-2048 and 948-2059), Open Systems Interconnect (OSI) standards activities (301 869-8630), and information about the North American ISDN Users' Forum (301 869-7281).

To access the bulletin boards, dial the number and strike your return key twice after "CONNECT" appears. For more information, contact the NIST's Computer Systems Laboratory at 301 975-2833. ▬

CAREER MOVES

The A.B. Dick Co., a graphic-arts industry supplier based in Chicago, has named JAMES E. HOPPER vice president of IS and CIO. Hopper comes to A.B. Dick from Tenneco Inc., where he has been since 1980, most recently as director of systems and computer services at Packaging Corp. of America, a Tenneco subsidiary (see "Blood, Sweat and Gears," *CIO*, January 1989). Hopper will report to A.B. Dick President James Bast.

VWR Corp., a Media, Pa.-based distributor of laboratory supplies, chemicals and equipment, has appointed RICHARD H. SERAFIN vice president of IS and CIO. Serafin has 23 years of IS experience, including stints with the Philadelphia office of Arthur Andersen & Co., the Philadelphia and Richmond, Va. offices of Arthur Young, and a position as a systems analyst and mathematician for the Naval Ship Research and Development Center in Washington. At VWR he will oversee the use of technology to enhance customer and supplier relationships.

DAVID SHPILBERG recently joined the New York office of Ernst & Young, a worldwide professional-services firm, as head of its financial-services IT consulting practice. Shpilberg has extensive experience in the financial-services industry, most recently as vice president of IT at Goldman, Sachs & Co., where he was in charge of systems for the worldwide Equities and Asset Management divisions. ▬

ILLUSTRATION BY DIANNE BENNETT

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Fear of Prying

As communication options have grown more sophisticated and various, so have the methods for invading personal and corporate privacy. Today's CIOs are caught in a morass of legal and ethical dilemmas that may threaten the well-being of their companies.

BY ALICE LaPLANTE

If you believe your biggest security problem involves guarding against theft, loss or unauthorized access to corporate data and program files, you need to think again—and fast.

A plethora of thorny issues put CIOs in the middle of what many experts predict will be the biggest legal and ethical battle of the century: the rules governing cyberspace.

"Cyberspace," a term invented by science fiction writer William Gibson, is increasingly used to describe the strange new domain where electronic communication occurs. And "communication" is defined broadly, covering everything from electronic mail to databases, telephone conversations, routine file transfers across networks and even radio and television broadcasts. In short, cyberspace is that no-man's-land created by a worldwide population of computer systems—which, after all, transgress geographical, physical and temporal boundaries—in which any kind of data is stored, manipulated, transmitted, added or erased in any manner whatsoever.

Sound vague? Like a potential legal and ethical vacuum? At a conference on "Computers, Freedom & Privacy" held in San Francisco in March, legal, technical and business experts debated such issues, and attendees came away realizing just how nebulous the current rules governing cyberspace are.

ILLUSTRATION BY KEVIN HAWKES

As guardians of the corporate cyberspace, CIOs should consider the following:

If your company's management decides to measure the productivity of keyboard workers or monitor the use of systems resources by reading interpersonal E-mail, you will be the one implementing the electronic tools to execute this policy. Aside from the ethical grounds for such actions—considered shaky by almost all conference attendees—there is a legal question. Already, several lawsuits have been filed by employees who charge that their privacy was violated when E-mail sent to coworkers was intercepted and read.

Epson America and Nissan Motor Corp. were the first firms sued over this matter, and they won't be the last. Although a California judge threw out the Epson case earlier this year, in effect stating that an employee has no right to expect privacy when communicating over a company E-mail system, legal experts say the court battle has just begun.

Then there is the issue of using electronic surveillance to increase productivity. Karen Nussbaum, executive director of the National Association of Working Women, estimates that 26 million employees in the United States have their work tracked electronically. Such surveillance, which includes measuring the number of keystrokes employees make as well as the length of their telephone calls or trips to the bathroom, is usually counterproductive, she said, in most cases causing increased stress and, ultimately, lower productivity.

Another conference speaker, MIT sociology professor Gary Marx, addressed the growing influence of technology on privacy in the workplace: "Thanks to the computer, the [surveillance] net hovering over employees is both finer and wider."

The Supreme Court has ruled that privacy is guaranteed to individuals only when "reasonably expected." But what can employees reasonably expect in the electronic workplace?

The quandaries of cyberspace extend beyond the company walls. If your organization has accumulated—during the normal course of doing business—customer lists that contain vital financial or personal data, you could be asked to help cultivate a lucrative new source of income for your firm by "renting" this customer data to other businesses, such as direct marketers, for hefty fees.

Sounds like good business, right? But there is a catch: a groundswell of public opinion against the sale of such data. Consumer advocacy groups are becoming increasingly vocal in their opposition to the "secondary use" of information gathered by one firm, then sold to another without the customer's explicit permission. Ignoring this groundswell could be hazardous to your firm's financial health.

When Pacific Bell, headquartered in San Francisco, proposed to rent out its list of customers and related data to direct marketers, the enormous uproar from the public made it very clear that "we really shouldn't do that," said Elliot Maxwell, assistant vice president for corporate strategy. "So our policy changed, and in the process, we learned more about our customers."

Another issue raised at the conference concerned the possibility of having corporate data seized by the law. If an employee using your company's computer system is suspected of illegal activities and law enforcement agents believe that evidence of such activities can be found in the system itself, your company's property could be seized and legally held—perhaps for years. This could include files, floppy disks, hard disks, even entire systems and networks of systems. In 1990 Steve Jackson Games, a small games manufacturer in Austin, Texas, had all property related to a computer game it was developing seized under the premise that the game's writer was a suspected "hacker" and the game itself a "handbook for computer crime." Although a court decision has yet to be reached, these actions have financially crippled the tiny company—perhaps fatally.

At issue is the Fourth Amendment, which requires courts to be extremely specific when issuing a search warrant as to what can be seized as evidence of a crime. But as conference speakers pointed out, it is often difficult for law officers, many of them technically naive, to know exactly what to look for when dealing with computers. "So they just take everything," said Sheldon T. Zenner, an attorney with Katten Muchin & Zavis in Chicago, a number of whose clients have had vital business files and equipment legally seized and kept for years. "Meanwhile, the company is without important records and files and equipment, making it difficult for them to go on with their daily business," Zenner said.

"Thanks to the computer, the surveillance net hovering over employees is both finer and wider."

–Gary Marx

Finally, if U.S. corporations don't prove to the international business world—particularly the European Community—that they will be tough on privacy and data security within their information systems architectures, they could face severe limitations on international trade.

Last year the European Commission issued a set of directives to guide member countries in creating "harmonious" data protection laws that would safeguard information gathered on private citizens, corporations and government agencies.

These directives would severely restrict doing business with countries that did not have similarly stringent data protection laws. The purpose: to avoid having certain countries become so-called "data havens," where data could be illegally accessed or massaged or otherwise put to "evil uses," according to Ronald Plesser, partner at the Washington law firm of Piper & Marbury. Although this set of directives was rejected by EC members as too vague, another set is due out in January 1993. Plesser warned that such actions could have a severe impact on the way U.S. corporations do business internationally.

"The fixation of the EC is on U.S. corporations, who they think don't take privacy seriously," agreed Tom Riley, a Toronto-based expert on international transborder data-flow issues.

Ultimately, the big question asked by conference speakers and attendees alike was whether existing laws were sufficient to regulate cyberspace, or whether new laws, modifications to current ones, or even a constitutional amendment was needed.

Laurence H. Tribe, professor of constitutional law at the Harvard Law School and the conference's keynote speaker, said that the Constitution must be read through a "technologically transparent lens." Tribe believes that no less than a 27th amendment explicitly protecting privacy rights in the face of technological advancements will suffice. Others were less sure. "The last thing we want to do is put the federal government in the middle of every information flow in the country," said Robert Veeder, acting chief of the information policy branch of the Office of Information Regulatory Affairs in Washington. Moreover, Veeder said, budgetary funding for such governmental interference simply doesn't exist.

One thing is clear: The debate on these and related issues has just begun, and CIOs, rather than waiting passively for legislation and judgments to be handed down, must enter the fray. After all, from the CIO's perspective, cyberspace is not the dangerous frontier that it represents to less-technically-savvy businesspeople and academicians; they enter it each and every working day. Who is better able to clarify and define the rules that will govern it?

Alice LaPlante is a freelance writer based in Palo Alto, Calif.

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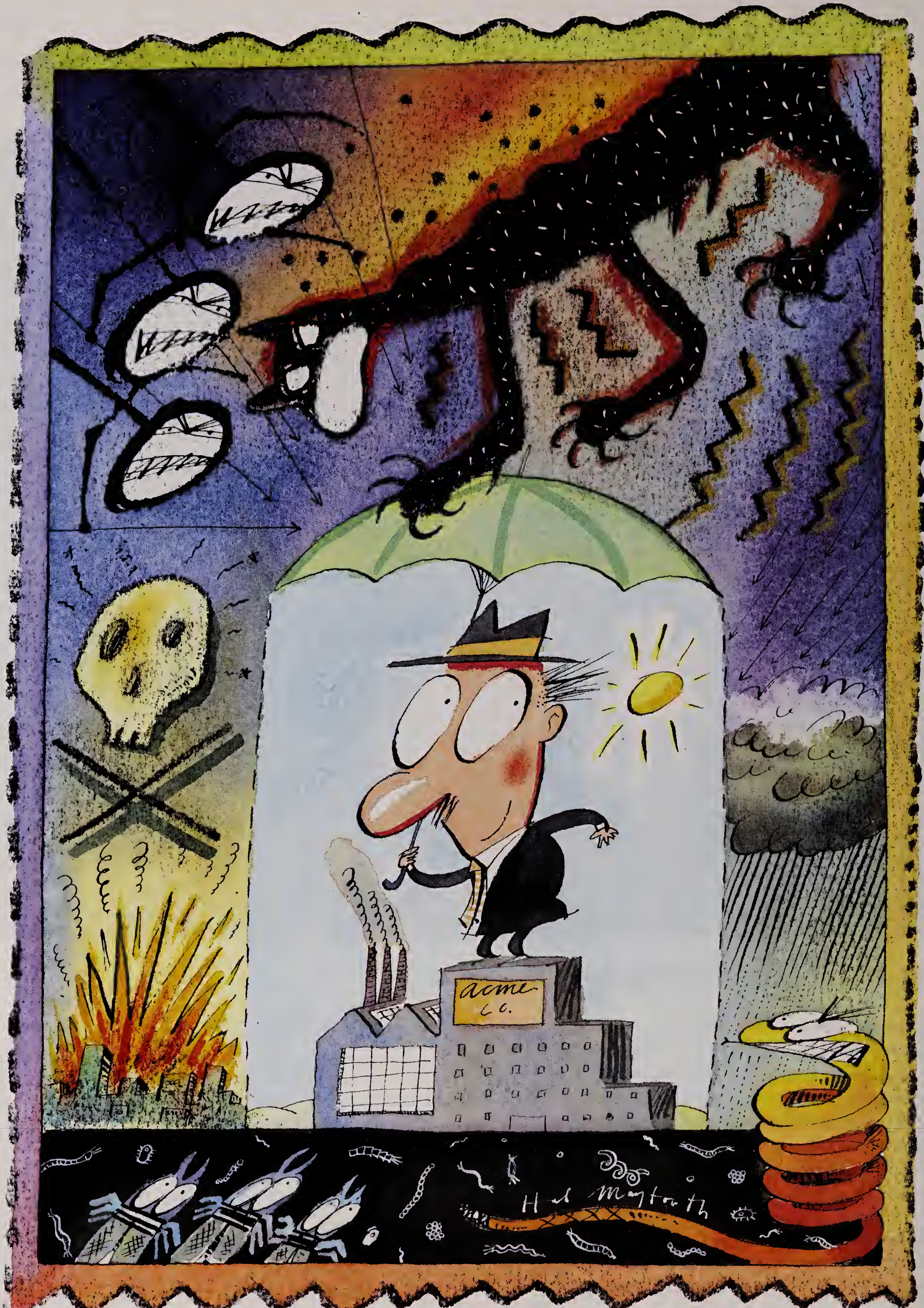
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A HEALTHY PESSIMISM

Adopting an appropriately gloomy outlook is all for the best when planning for the worst. If disaster strikes, the surest guarantee of a rapid recovery is well-rehearsed preparedness.

BY THOMAS KIELY

Planning for ways to continue working, should some untoward disaster strike down a company's critical IS systems, has long seemed to many senior managers to be a tedious, expensive exercise—necessary, maybe, but a bother. Like composing a will when young and healthy, planning for that bolt from the blue can seem unreal, even a shade hysterical.

Now it has also gotten complicated. Not long ago, IS disaster planners could confine their worries to anticipating what to do if a fire swept through the data center or if a burst water pipe drowned the corporate mainframe. Not any more. Thanks to the advent of LANs, WANs, communications and distributed systems, a corporation's IS operations are a great deal more complex—and far more integrated with business functions. Recovery plans addressing these new realities may begin to look like logistical nightmares.

For instance, the applications and data churned by end users on LANs are now as critical to the daily operations of many corporations as the larger applications on mainframes. But backing up the mainframe is one thing, while drawing multiple end users from multiple departments into a network recovery plan is quite another. Business transactions lost on an EDI

ILLUSTRATION BY HAL MAYFORTH

network could throw a wrench into the operations of a just-in-time manufacturer and its suppliers. But how does a company ensure these records will never be lost without letting the costs for such assurance get out of hand? Power outages, severed cables and disruptions at a telephone carrier's facility can dramatically disrupt a company's daily business with remote factories. There are contingency plans that most companies can adopt—many, many different options—but which ones best match the needs of a corporatewide recovery plan?

> *These days, planning for the aftermath of a disaster is a hybrid project, incorporating resurrection alternatives for both the business operations and the information infrastructure that sustains them.*

These days, planning for the aftermath of a disaster is a hybrid project, incorporating resurrection alternatives for both the business operations and the information infrastructure that sustains them. This is a more complex undertaking, experts say, but it still involves basic blocking and tackling: a realistic appraisal of the impact a disaster might have on daily operations, detailed contingency plans, and lots of testing.

Typically, today's disaster plans will begin with the CIO, but they won't end there. "You want the CIO to be the point person to develop the [recovery] plan," explained Jim Kennedy, a Bethesda, Md.-based Booz-Allen & Hamilton vice president. But since outages could disrupt many different departments in a company, not just the data center, and have repercussions with customers or suppliers, Kennedy and other disaster recovery consultants stress that the company's senior manager should also be involved in the planning process.

"When you're talking about [recovery planning], what you're really doing is talking about protection of corporate assets," said Edward Evans, president of Comdisco Consulting Services in Rosemont, Ill. "That becomes real important to a CEO and CFO, because that's what they're being paid to do. In fact, they can go to jail if they don't do it."

The participation of the CEO will also help to ensure that the recovery plan encompasses the entire enterprise. A disaster recovery plan should begin with an analysis of end-user departments, said John Butch, division manager of HOTSITE, a disaster recovery vendor based in Niles, Ohio—and it is difficult for CIOs who are not members of top management to do that alone. "The data center [recovery] plan could be headed up by the CIO," Butch said, but if the CIO is little more than the data center manager, he or she may "have blinders on about what other departments need."

Departmental end-user recovery—not simply recovery of hardware, software and communications—is critical to a company's ability to continue its operations following a disaster, pointed out Doug Weldon, division manager for crisis management services at AT&T in Warren, N.J. And end users need a plan. If the building is shut down for any reason, employees are going to need alternative sites and the tools to continue to do their jobs. And that means backup LANs, backups of PC and server data, backup PBXs, backup connections to mainframes and minis, and backups of whatever voice technologies they need.

It also means backups of many paper and fiche records—what Weldon calls "the vital records" of core operations. Chuck Willis, vice president of Fourth Financial Corp., a Wichita, Kan., holding company for 13 banks, said that his company arrived at the same conclusion two years ago when it first began to implement a recovery plan. "We started out with a data processing plan [for disaster recovery]," Willis said. "But not all our business needs are on a computer. What good does it do to recover the data center somewhere if the rest of the corporation doesn't survive?"

Instead, Fourth Financial developed 48 end-user plans (one for each department) that focused on recovering the business, not just the technology. The combined plans call for relocating end users at alternative sites. The bank then ran managers through a paper test of a mock disaster.

"If a corporation considering business function [recovery] planning is only thinking about recovering the magnetic media, they shouldn't do it," asserted Comdisco's Evans. "It's a waste of time. They will only recov-

er a piece of the business."

In well-thought-out recovery planning, recovery consultants, working with senior management, try to calculate the impact of system outages on departments or functions and then create a matrix of all this by priority over a duration of time. For instance, corporations should distinguish those business systems that would be completely undermined by a loss of computers from those that can be converted, temporarily, to a manual system. They need to ask what data—automated or not—is essential to each operation, and whether it is backed up. What about other technologies, such as voice or imaging?

Once these issues have been tackled, planners must also identify the business functions that are immediately critical to the company's operations and those that are of secondary or tertiary importance. Finally, they need to determine how long the company can exist without each function—an hour, a day, a week?

The probability of a disaster should be another variable weighed in this initial planning process, according to Booz-Allen's Kennedy, in large measure because this will help planners to gauge reasonable costs for a recovery plan. Kennedy advises corporations to begin with a business impact analysis, but then to ask for each item: "If I lost it, what would it cost me? And what is the probability that I could lose it [in the first place]?" Kennedy suggests that planners graph the business costs of various outages against their probability and the frequency with which they are likely to occur. Such a graph will help planners quickly identify where outages are both probable and costly—and therefore deserving of more attention in a recovery plan—and where they are unlikely and inexpensive.

Armed with a sense of the eventualities, recovery planners then turn their attention to contingency planning. Such planning includes hot sites (emergency recovery data centers, whether stationary or mobile), various methods to back up critical data, specialized service bureaus, and alternative communications tools.

The right combination of business and IS recovery solutions will differ from company to company, depending upon how many systems are deemed critical and how quickly each must be recovered. For example, banks doing more than $20 billion worth of business a day in wire transfers are now required by the New York Clearing House Association to recover within six hours and to re-

Data Indemnity

Sound disaster planning includes insuring the company's vital business information against loss and interruption

As corporations forge their disaster recovery plans, senior managers ought to take a second look at their companies' insurance policies. The loss of information pumping through LANs and WANs may not be covered—ditto the lost revenue that could result from an information disaster.

"Insuring [business] information is complicated," explained Marr Haack, director of marketing for technology underwriting at the St. Paul Fire and Marine Insurance Co. in St. Paul, Minn. Most large companies have insurance policies that will cover interruptions to their business, but these policies typically protect real assets, such as facilities, equipment and inventories. They may also cover lost business income or some recovery expenses.

"But data is not usually thought of as a traditional property," Haack said. The intangible information that feeds many critical business operations—and the loss of income that could result from lost information—usually isn't protected. "What about the vulnerability of businesses doing EDI?" Haack asked. "What happens when the network can't network?"

According to Haack, corporations can purchase additional insurance to cover the loss of applications and data, "but if they have a business interruption policy that already protects them, why do a separate policy that focuses just on information?" The better alternative, he argues, is to expand existing coverage to include information—that's his company's tack.

To do this, Haack advised, "corporations should try to make sure the underwriter and the broker are part of the risk management effort." Corporations can keep the costs of this broadened coverage down by putting together good contingency plans. Just as fire insurance will cost more if the building isn't equipped with a sprinkler system, insurers will be more inclined to give breaks to companies that have drawn up workable contingency plans and implemented information safeguards.

But Haack said the real savings come when a company, by minimizing its risks, reduces the amount of insurance it will need to purchase. A company that will take several days to recover from a disaster will need more coverage—at a higher cost—than the company that can recover in a day.

—*T. Kiely*

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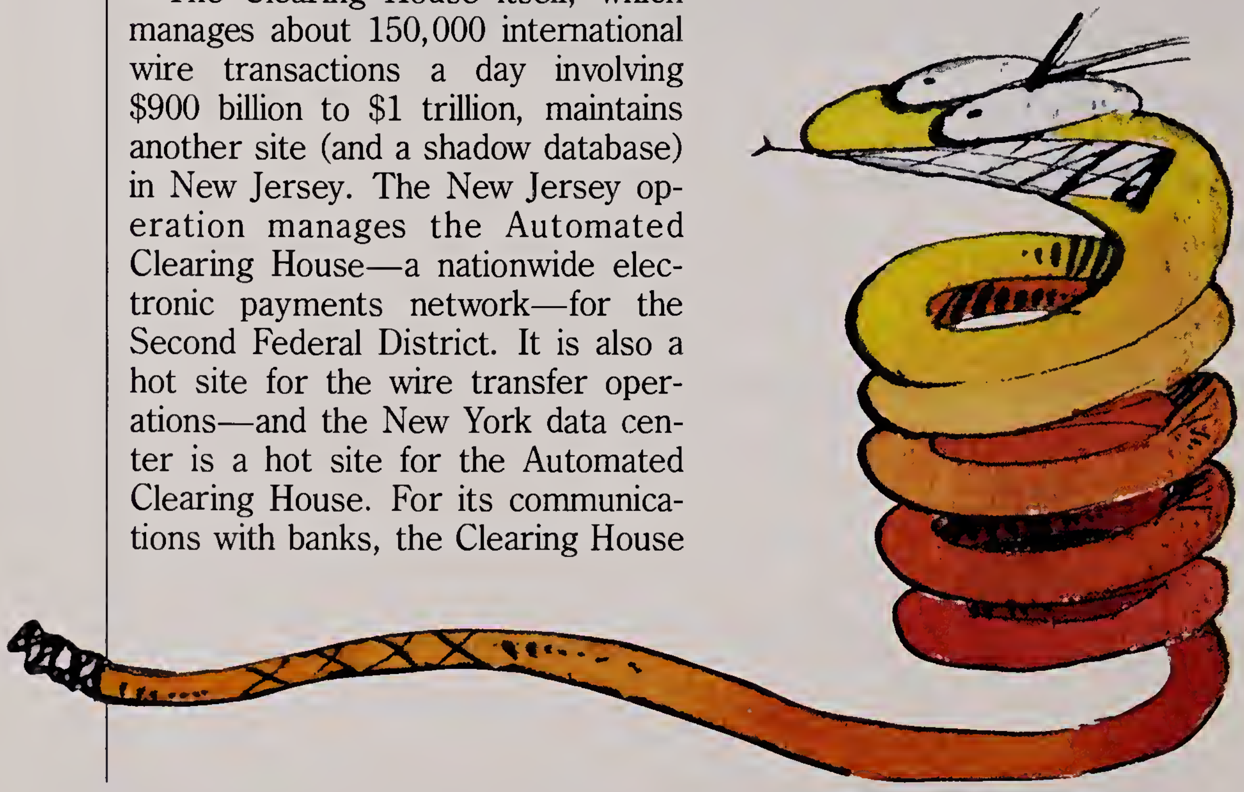
> *"When you're talking about recovery planning, what you're really doing is talking about protection of corporate assets. That becomes real important to a CEO and CFO, because that's what they're paid to do. In fact, they can go to jail if they don't do it."*
>
> *–Edward Evans*

store all data to the point of failure. That requires banks to implement expensive options like database shadowing (electronic, real-time backup of all transactions to a "shadow" database maintained at an alternate site).

The Clearing House itself, which manages about 150,000 international wire transactions a day involving $900 billion to $1 trillion, maintains another site (and a shadow database) in New Jersey. The New Jersey operation manages the Automated Clearing House—a nationwide electronic payments network—for the Second Federal District. It is also a hot site for the wire transfer operations—and the New York data center is a hot site for the Automated Clearing House. For its communications with banks, the Clearing House uses private lines, with switch access through the telephone company so that the lines can be quickly rerouted. George Thomas, senior vice president and director of data processing at the New York Clearing House, said his system can recover from a disaster "within five minutes" and recover data to the point of failure. The price tag for all this is in the millions, annually.

Disaster planners can pick from a plethora of solutions—it all depends upon how much they are willing to spend. In some distributed environments, planners may decide to shadow critical data on LANs or departmental minicomputers to the corporate mainframe, but to back up the mainframe only once a day.

In some areas of the nation, according to Booz-Allen's Kennedy, planners can design complete communications redundancy into a recovery plan. This would include dual access lines in the last mile to headquarters, or measures to switch over two different long-distance carriers. In 11 U.S. cities, including Boston and New York, many corporations can hook into a network managed by Metropolitan Fiber Systems Inc. of New York—and are thereby not solely dependent upon the fortunes of local carriers.



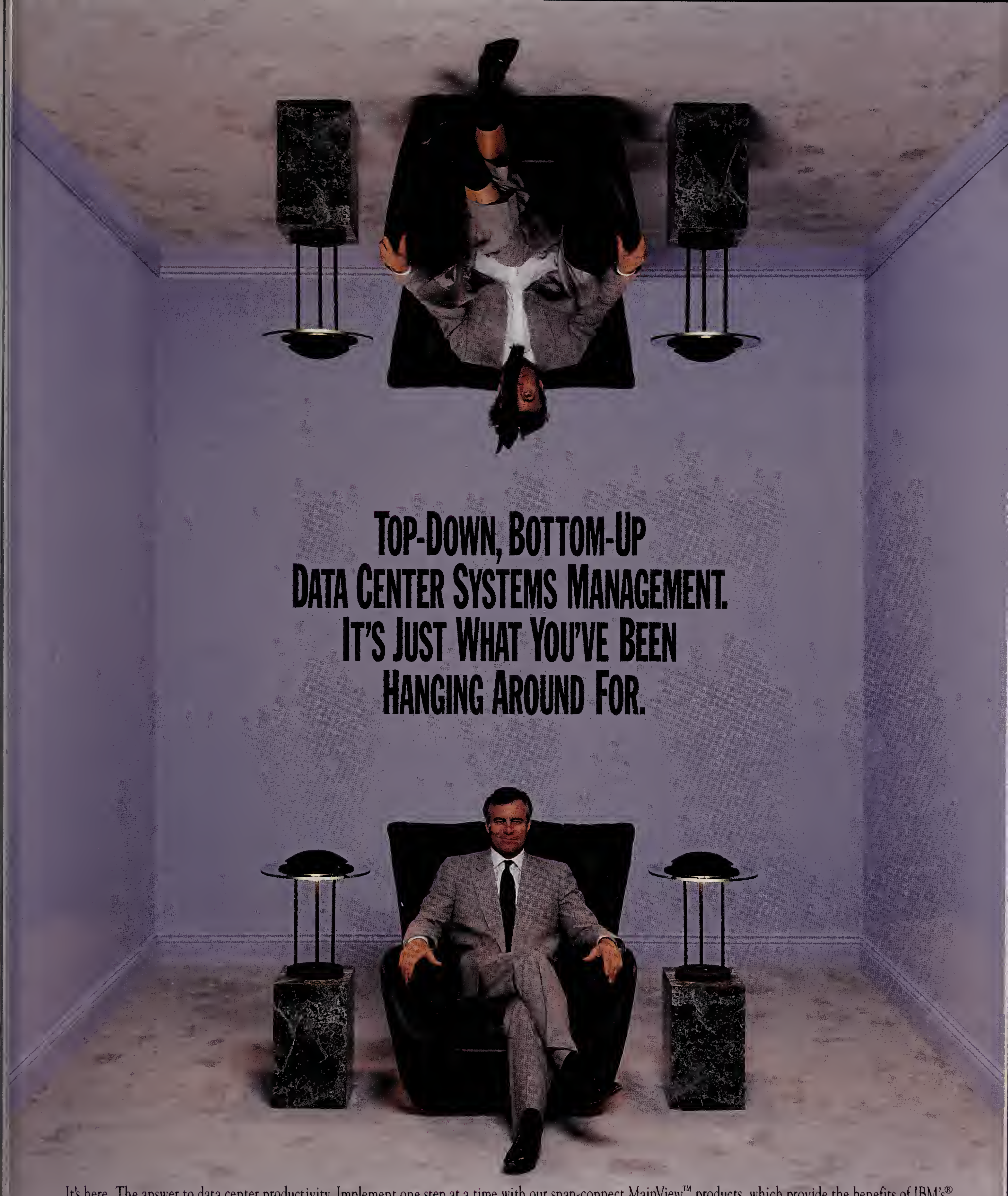
It all depends on how much senior managers want to pay. Glen McDermed, program director of enterprise storage strategies for the Gartner Group in Stamford, Conn., said that he often hears companies gripe about the high costs of recovery systems. "On the other hand, if you figure that the enterprise's survival might depend upon being back on the air in a matter of hours, [the cost of recovery options] is an insurance policy," he said. "You can't afford to have it, and you can't afford to be without it."

Financial service companies have been—and remain—the big spenders for recovery services. But both Comdisco and HOTSITE report that manufacturers have become a fast-growing vertical segment of their respective client bases. The reason is the increased use of EDI and automated manufacturing processes. For these companies, information is increasingly key to getting materials to the production lines and getting product out the door. Recovery plans must reflect that.

At Chrysler Corp. in Centerline, Mich., for instance, EDI is critical to the automaker's just-in-time production. (Chrysler does about 17 million EDI transactions a year.) "Our host for EDI is a Tandem CTX-based system," said Bill Harder, manager of material control systems. "It can recover at the point of failure." If a failure were to occur at a supplier's site, Chrysler could resend the transmission.

Lost shipping information, in some significant instances, could badly gum up the JIT works. "The loss of some transactions won't bring our world [of EDI and JIT operations] to its knees," said Harder, "but some will." The company uses a satellite network to communicate some business-to-business transactions between various Chrysler plants, and Harder said that it would be possible—if necessary—to bring key EDI suppliers into this network.

But the most complicated part of the recovery plan is figuring out how to redeploy end users. "There is a . . . requirement that is key to end-user recovery which is different from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traditional data processing [recovery], and that is the need for a geographically proximate recovery location for end users," explained Bruce Battjer, senior vice president for product development at SunGard Recovery Services Inc. in Wayne, Pa.

Companies can't afford to move whole departments of end users to expanded hot sites in a neighboring state or halfway across the country—not to recover from a disaster, and certainly not to test in anticipation of a disaster. Employees would undoubtedly balk at the disruption in their lives too. So any end-user sites must be situated close to the existing work location. Comdisco has built three end-user recovery sites and plans to build 14 more in coming months. AT&T opened its first end-user facility this summer but intends to rapidly expand similar facilities nationwide—leveraging off space in its network of central office sites. SunGard is forming strategic alliances with AT&T and others to provide these facilities to their customers.

> *"If you figure that the enterprise's survival might depend upon being back on the air in a matter of hours, the cost of recovery options is an insurance policy. You can't afford to have it, and you can't afford to be without it."*
>
> *–Glen McDermed*

End-user recovery sites, according to Battjer, will be secure buildings that contain "things like LANs, PCs, terminals, and of course telephones, as well as copiers, fax machines and other standard office equipment."

But providing all this can be complicated for vendors. As AT&T's Weldon pointed out, different customers have different LAN requirements—not to mention different LAN-to-mainframe connectivity requirements. Some must be connected to a hot site and a shadowed database; others back to a data center untouched by the disaster. End users may also need 800- numbers and special inbound or outbound voice and data services. One corporation may need a PBX attached to a microcomputer, another to a mainframe. "There is a tremendous amount of customization needed," Weldon said.

But experts stress that recovery plans must be tested—and tested regularly. HOTSITE's Butch compares disaster recovery plans to writing software. "No one writes programs that work the first time. It's the same with [recovery] plans. You have to test it to work the bugs out."

Gartner Group's McDermed agrees. "If you don't rehearse disaster recovery, there is a pretty good chance—an outstanding chance—that it won't work," he said. "Even those that rehearse on a quarterly basis say that, invariably, something goes wrong [in a test]. Of course, with each rehearsal, you get better and better [at it]. But if you don't rehearse, there's a pretty good chance your *recovery* will be a disaster."

Testing also helps to keep plans current. "No one's information environment today is static," said Linda Carpenter, national sales manager for XL/Mid-range Recovery in Hinsdale, Ill., the recovery services arm of XL/Datacomp. "You're constantly maintaining and updating what you're doing."

But when a real disaster strikes, even plans tested extensively will contain flaws. Manufacturers Hanover Trust Co. lost its data center for two weeks during last summer's power outage in New York. The bank's recovery plan has been evolving for a decade. So when the power went out, the bank knew what to do. IS staff rushed to a hot site maintained by Comdisco and brought up critical applications within 24 hours.

But Senior Vice President Steve Sheinheit said that his bank's plan also had unforeseen shortcomings. "We learned a dozen lessons [from the event]," he said. For instance, when disaster struck, there were not an adequate number of PCs to handle critical applications, and the bank had to take over less-critical LANs to get the work done. While Manufacturers' employees had intermittent access to darkened offices in the bank, disaster planners are now considering contingency plans for future disasters that might not allow even limited access to the building. And Sheinheit said the bank had some initial difficulties getting end users to the right alternative locations, communicating with them on the fly and implementing "a command center." There were also a few trivialities, "like did we have enough flashlights?" Sheinheit said.

Manufacturers has subsequently had a handful of "near disasters," he continued, including a data center closed because of possible PCB contamination (following a fire), and a cut AT&T cable. "With all the things we've hit, we've learned a few things each time, and we see where we can improve," Sheinheit said. "But we've also been lucky—or good—with what we have in place."

There is another kind of disaster planning, however. Following that same New York power outage, the CEO of a Japanese corporation with offices in New York visited Comdisco offices to discuss recovery options. Mid-discussion, the Japanese CEO noted that during the outage, "the building on the left was dark, and the building on the right was dark, but my building still had power. Luck is cheap." CIO

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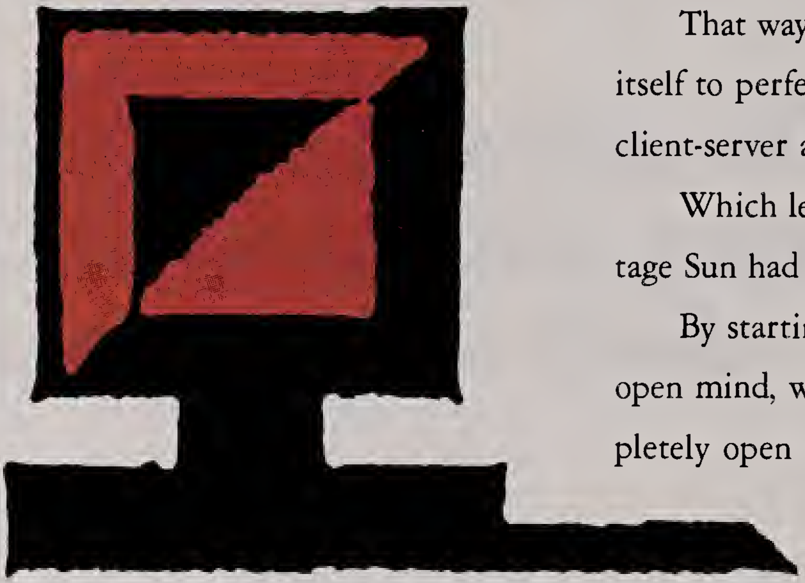

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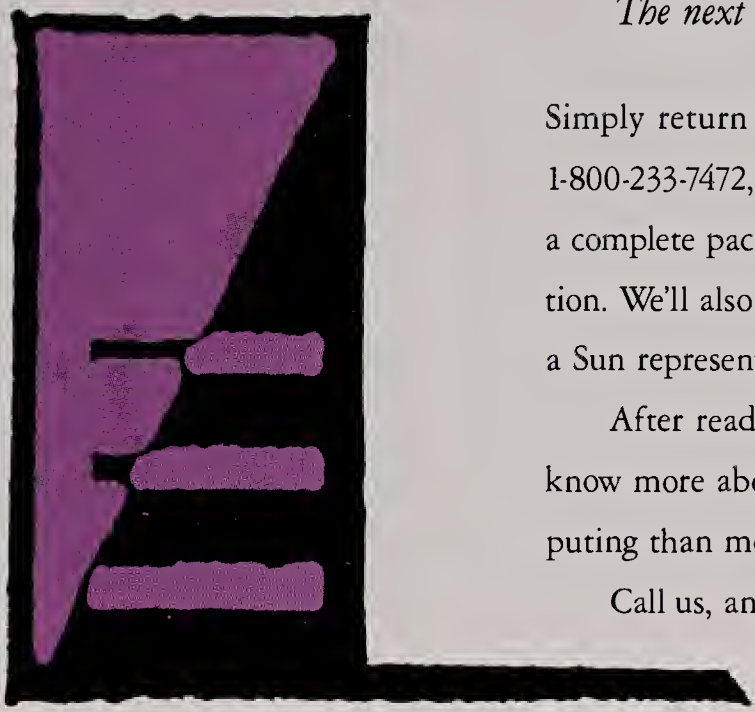

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AIRPORT '91

The redoubtable CRS may be the runway on which airline IT taxis, but carriers are increasingly revving up nimble distributed systems for a wide body of applications

BY MEGHAN O'LEARY

More than 3 million people travel by air every day. Analysts project that by the year 2000, tourism will be the world's largest retail industry. Deregulation around the globe has pitted airlines against each other in fare and ridership wars. Mercurial oil prices and intense competition have forced smaller or less efficient companies out of business. More than ever, profitability and survival depend on how well an airline prices its seats up to the moment of departure. In turn, ridership levels depend not just on prices, but on how efficiently an airline interacts with its customers and its distribution agents.

"The airport is a just-in-time factory, except you have people marching through it instead of widgets," said Barry Kotar, senior vice president and CIO of Northwest Airlines, based in Eagan, Minn. "How fast you get people through directly impacts productivity, customer satisfaction and cost."

CARL FAULKNER: *"It wouldn't take much to*

PHOTO BY ALAN D. LEVENSON

improve the whole airport system, from check-in to seat selection."

IS Pushes Back from the Gate

Regional phenomenon America West Airlines, which once ‘outsourced almost everything,’ has begun its final descent into in-house systems

The airline industry—where the price of fuel can kill profits, where customer loyalty is often determined by a free upgrade, and where the players are getting fewer and bigger—does not invite newcomers. Running an airline requires vast IT resources to handle reservations, inventory control, scheduling, maintenance, frequent flier records and a host of back-office financial and administrative functions. Starting an airline requires putting such complex and costly systems into place from scratch, as well as finding a way to differentiate a new company from those who have dominated the marketplace for decades.

JOHN C. KING: *Distributed systems promise to positively affect airlines' on-time performance.*

PHOTO BY SONNY WILLIAMS

> **“Anytime the mainframe is down, the pilot can't back away from the gate. When that happens you end up with 150 flight delays in 10 minutes. And then it's real hard to manage . . . because 150 airplanes run late for the rest of the day.”**
>
> *–John C. King*

Airlines have spent years automating the distribution channel and nothing else, Kotar explained. As a result, the central reservation system (CRS), the pivot on which the travel industry turns, has now reached lumbering maturity and ubiquity. But today's airline CIOs are looking beyond this cornerstone, working to add value to the distribution process by building intelligent, distributed networks around their CRS cores. They're putting the CRS in the background and moving the information resource outward by shifting from proprietary, centralized systems to open, decentralized systems supported by local application development. They're using higher-level languages to develop software, leading to greater ease of development, maintenance and integration. Giants such as American, Delta and United are also making commitments to the standards of X.25 and the Open Systems Interconnect model—the seven-layer communications protocol intended as an international development standard for worldwide systems.

The resulting networks will allow the airlines to take advantage of their vast CRS resources while delivering information and processing power closer to the customer.

From a basic operational standpoint, a distributed network is needed to better monitor airline performance. Airlines are highly integrated businesses, according to Kotar. “We don't have stand-alone business units within the airline. You cancel a flight

On such an unforgiving proving ground, the 7-year-old success of Phoenix-based America West Airlines is impressive—the result of an aggressive business plan and a conservative approach to building MIS.

"Historically, we have outsourced almost everything," said Carl Faulkner, senior vice president and CIO. "Initially, there was no resource to do maintenance in-house, or capital available to do it with, so it was a very clear strategic decision that everything would be outsourced. Up until four years ago, the whole airline was run on a couple of PCs."

Outsourcing was the first of three stages in the then $250 million airline's IS growth. The second stage involved building an IS function and bringing some operations in-house. "Once we started planning for a new building and a maintenance facility, it became evident that we had to have the capability internally," Faulkner said. "Plus, things were happening internally: PCs were here and there, departmental systems were springing up, and there wasn't any focus to that."

The company began building a data center and decided to bring the maintenance-performance and -tracking function in-house. It chose a Unisys platform and a 4GL that would enable it to develop and expand the applications quickly in order to keep pace with the company's growth, which ranged from 30 to 100 percent annually.

The maintenance system was up in less than a year. Today, the data center's Unisys, IBM and Hewlett-Packard mainframes handle financials, flight operations and the frequent-flier database as well. In the next five years, they will add flight and crew scheduling, flight planning and non-CRS reservations activity.

Now that the company has attained $1.7 billion in annual revenues, its explosive growth has stabilized and IS is entering its third stage of development. A newly built technology platform will likely give America West an advantage in the future over larger, better-established airlines with massive investments in decades-old technology. The airline's new hub in Phoenix is, in Faulkner's estimation, "the most advanced hub in the world," featuring a 2,000-node token-ring network that will deliver much greater functionality to reservation and service representatives in their dealings with customers.

"Basically, I've got the opportunity to build a completely brand new, state-of-the-art airline," he said. "I think that will give us a significant competitive advantage."

—*M. O'Leary*

to Tokyo, and it has an impact in Fort Myers on maintenance and a connecting flight."

Distributed systems promise to positively affect airlines' on-time performance by decentralizing the networks' points of failure, according to John C. King, vice president of communications and information services for Delta Air Lines Inc. in Atlanta. King describes a situation in which delays are common.

"Anytime the mainframe is down, the pilot can't back away from the gate. When that happens you end up with 150 flight delays in 10 minutes. And then it's real hard to manage . . . because 150 airplanes run late for the rest of the day.

"A system like ours is very synched up. Our claim to fame is in optimizing our [flight] connections. So you can spend hundreds of millions making your mainframe reliable, or you can set up a PC in the gates and send the information to the PC. It gets you down to [where] your point of failure is a single PC in a gate rather than a mainframe, and you have one plane running late instead of 150."

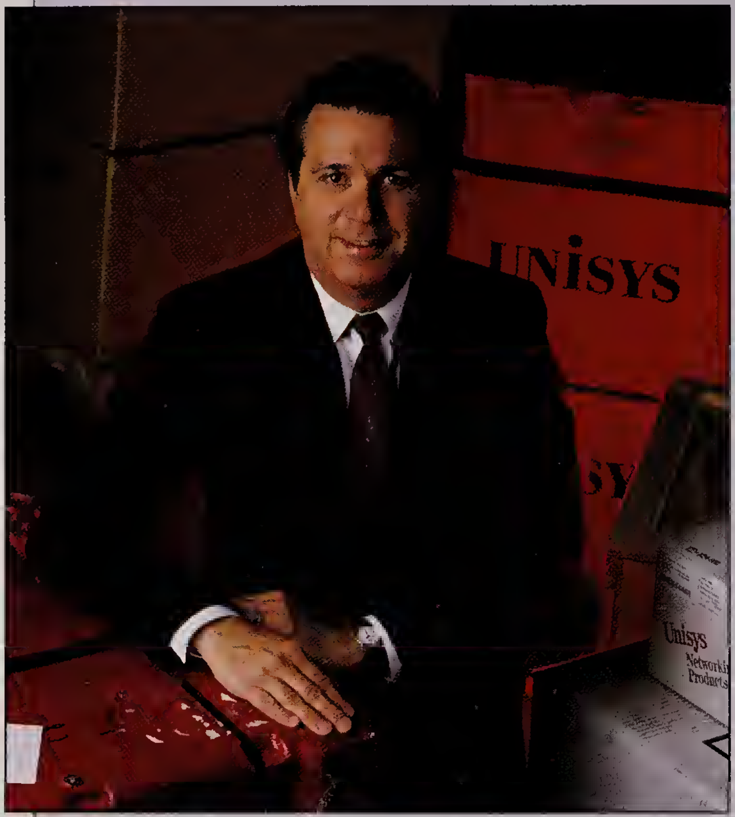
Although improving on-time flight performance is a critical part of better customer service for most airlines, it is not the only measure. Service is a broad arena in which the system is only as good as the attitude that spawns it, and the small airlines often outperform the large ones. America West Airlines of Phoenix has a limited technology infrastructure but has grown explosively thanks to an aggressive service strategy.

"We're marketing a couple of things," explained America West Senior Vice President and CIO Carl Faulkner: "our on-time record and our better customer service." This is an airline that serves free cocktails on all flights and whose modern substitute for the passé term "stewardess" is not flight attendant but cus-

Learning the Box-Step

Airlines move people reasonably well; but when it comes to tying up the package business, many loose ends still need to be mastered

If you fly an airline that carries both people and packages, don't be surprised if you get bumped sometime in favor of a box about your size. The airlines admit that they'd prefer to take the extra package because it generates more revenue. And it never asks for extra nuts.



DEL BLOSS: *"Functionally, cargo is five times more complex than reservations."*

Nevertheless, many airlines' automated cargo systems are far behind their passenger systems. "Functionally, cargo is five times more complex than reservations," said Del Bloss, president of Unisys Corp.'s Airlines and Communications Systems Division in Blue Bell, Pa. A package "requires constant tracking and monitoring" and a vast amount of paperwork.

At the most basic level, commercial carriers are struggling to maximize cargo shipping on limited scheduled flights, and to track packages' progress more closely through the use of bar-code scanning and self-correcting reporting systems that will send up a flare when a package misses its scheduled flight. They are also beginning to court freight forwarders—the travel agents of the cargo segment—with systems and better service. The easier an airline makes it for a forwarder to schedule shipments, get updates and receive and pay bills electronically, the more likely it is to get business.

—M. O'Leary

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tomer service representative. Most recently, the airline last month slashed unrestricted coach fares by up to 40 percent as a low-cost provider of business travel.

It is also an airline that seven years ago outsourced its entire IS function in order to get started in the business and focus its resources on improving customer service (see related story, Page 42). Today the company is bringing IS in-house piece-by-piece at a pace that lets it position each component to support its service goals.

America West, which has grown from a $250 million airline four years ago to a $1.7 billion airline today, is evidence that growth and success in this highly competitive industry rely more and more on having service programs in place that are supported by a subordinate IS structure. The larger, older, more technically advanced airlines did the reverse—engineering service into an established IS structure.

Another small carrier whose technology supports a long-standing customer-service tradition is Seattle-based Alaska Airlines Inc. Alaska's bread-and-butter clientele includes many business travelers who decide to fly at the last minute and expect to find seats available. To that end, the airline's automated yield-management system (which determines how many seats to sell in what price classifications) factors in the needs of these show-up travelers. The airline also keeps an online log of customer complaint calls. In part for its excellent customer service, Alaska Airlines has been voted the best airline in the world by *Air Transport World*, and readers of Conde Nast's *Traveler* magazine have voted it one of the 10 best airlines for two years running—a significant distinction for a carrier that handles only 1 percent of domestic travel.

Growth and success in this highly competitive industry rely more and more on having service programs in place that are supported by a subordinate IS structure.

For many companies, improving the experience of the traveler necessitates improving the experience of the system user. "Have you ever bought a ticket at an airport?" asked America West's Faulkner. "That's an awful process—and that's the interface we're talking about improving. I've got our little guide to using the system and I've got 25 years in this business, and I *still* can't figure out how to use it. It's that bad."

Faulkner reasons that if the agents are focusing on using the reservation system, they're probably not paying

PHOTO BY EUGENE MOPSIK

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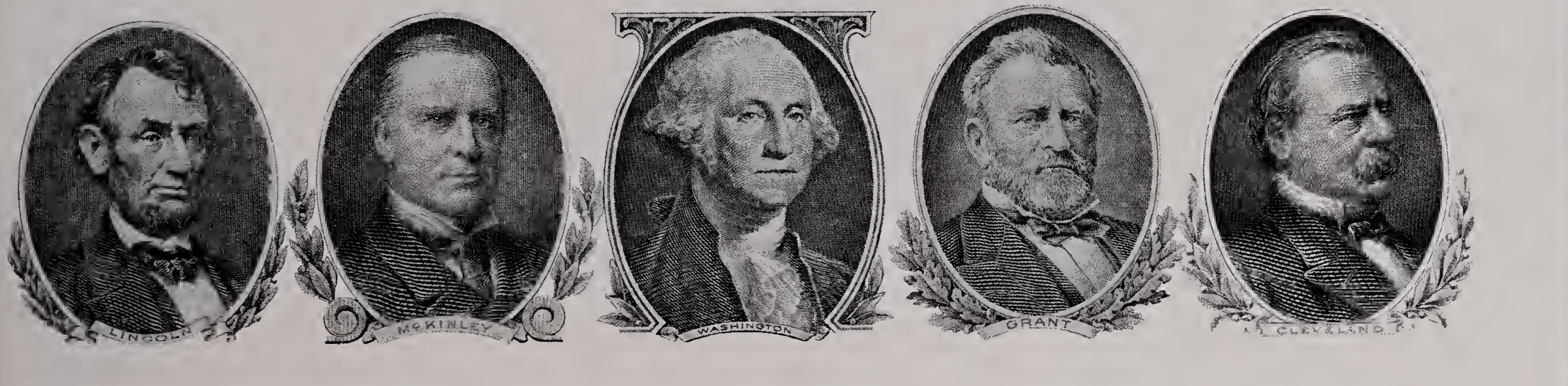

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enough attention to the customer. America West's agents currently receive six to seven weeks of training on their systems. Faulkner hopes to reduce that to two days with an intelligent interface that the company will be testing this summer at its state-of-the-art hub in Phoenix before rolling it out to regional reservation centers. A more hospitable, intelligent front-end would let agents easily access customer profile information that could further improve and speed the transaction. The ultimate friendly interface would allow customers to bypass the agent and paper ticket altogether, if they preferred.

"It wouldn't take much to improve the whole airport system, from check-in to seat selection," Faulkner said. "Those sticky tabs are by far the best way to assign seats because they're visual and you can't assign the same seat to two people. [With intelligent workstations] we could make those electronic."

With an intelligent network, ex-

One Travel Agency Bucks Airline Headwinds

Rosenbluth has grown its own CRS solution, and assured itself the freedom, flexibility and tools to give customers a full range of services

DAVID MILLER *wasn't afraid to take on the airlines when he reclaimed Rosenbluth's distribution process.*

PHOTO BY EUGENE MOPSIK

Because U.S. travelers credit travel agents with offering a broad selection of flights and one-stop shopping for other travel services, they book 85 percent of their flight reservations through agents. Despite their connection with the masses, however, travel agents have traditionally had little clout with airline reservation systems vendors. Agencies typically make a commitment to proprietary, turnkey systems from one vendor. In a business where the margins are small, agents rely on CRS vendors for price breaks in return for a contract. As a result, the airlines end up controlling the distribution process.

But Rosenbluth Travel of Philadelphia has managed to finesse the airlines. Rosenbluth, an international, family-owned business specializing in national travel accounts, began five years ago to free itself from the CRS stranglehold. Chairman Hal Rosenbluth's vision of an international travel company and information broker spurred newly hired Vice President of Global Information Technology David Miller to begin developing an in-house IS department and to reclaim the distribution process.

Rosenbluth's high-volume corporate clients wanted three things: reports detailing expenditures and identifying ways to save money; accounting interfaces that would allow easier billing and reporting and reduce the amount of paper-passing; and the leverage to negotiate prices based on volume. Miller focused his early efforts on the back-office systems that could deliver these reporting functions. He anticipated moving from regional reporting to a central database that would provide real-time "snapshots" of corporate accounts.

At that time, the company had an annual sales volume of $250 million. The only systems capable of handling such volume—the CRSs of American and United airlines—"were clones of each other," Miller said. "Their market share was like 85 percent. They had the same source code." They also had no printed specifications for customizing them in any way. Miller instead chose an integrated database package from a small company called Travel Resources Inc. in Miami.

For front-office systems, Miller did something still more upsetting to the CRS vendors: He created a technology lab and invited United, American, TWA, Delta and Texas Air to demonstrate that their systems performed as advertised. "I came from MIS management, and I'd never seen a situation where there was only one supplier, especially one with no published specs or a review by Datapro [a market-research and publishing company]," he said.

United, the company's supplier, "felt that Rosenbluth was getting very uppity," Miller admitted. "Our response to them was that we're going to grow so much that even though you may not have 100 percent market share, you're going to end up with more CRTs."

In addition to increased market share, Rosenbluth offered CRS vendors critical feedback, comments from customers and beta testing of new products.

Today, Rosenbluth's gross sales exceed $1.3 billion. "Our strategy was extraordinarily successful," said Miller (now vice president of global information technology) of the broad range of client reporting services and systems that have allowed the business to grow so rapidly. "For years we were the only mega-agency that was able to deliver [the service quality and volume corporate customers wanted]."

Rosenbluth Travel remains a strong advocate of determining its own destiny. "[One reason] our competitors had trouble was that they were looking to the airlines to lead the charge to meet corporate America's needs," Miller said. "Do you think, if you have a vertically integrated, controlled monopoly, that you are going to write software that allows your clients to get better rates from other people?"

—M. O'Leary

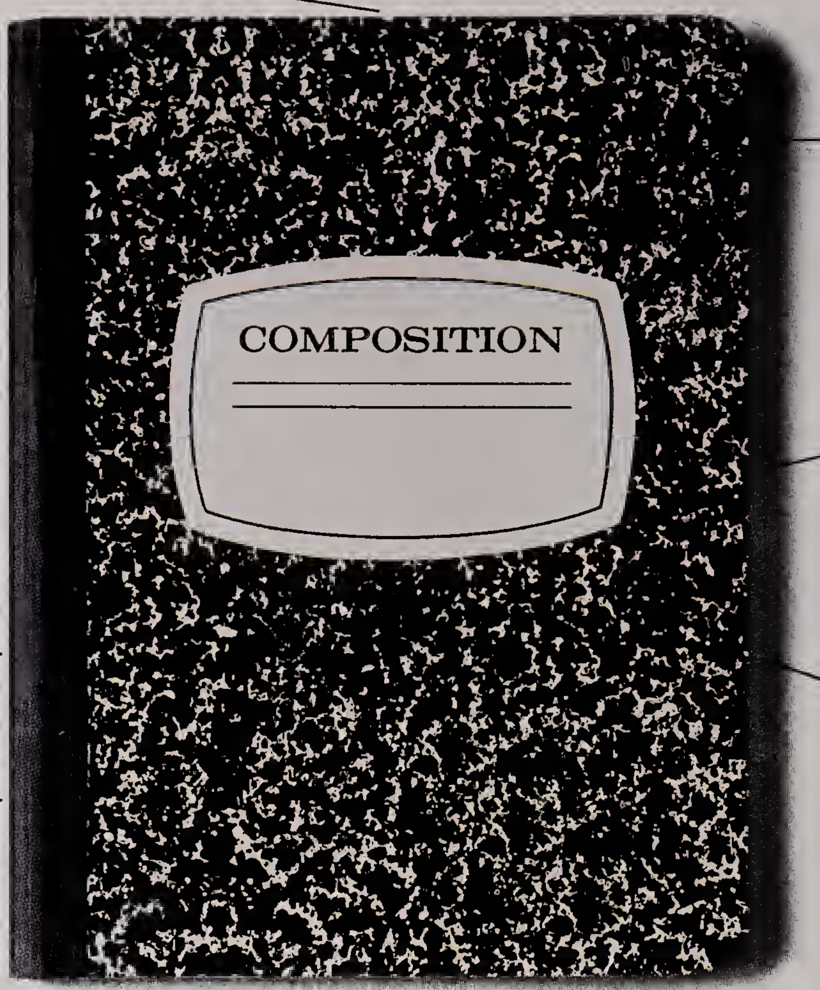
BARRY KOTAR: *"The airport is a just-in-time factory, except you have people marching through it instead of widgets."*

PHOTO BY STEVE NIEDORF

plained Delta's King, "we [already have] a lot more information about who the customers are and what they want. We don't have to ask them silly questions about what kind of seat they prefer." When that familiarity is established, the reservation agent can concentrate on the interaction with the customer.

Delta is one of a number of airlines trying to bring greater functionality and more flexible products to travel agencies, as well as to their own agents. (Travel agents handle roughly 85 percent of airline bookings.) A partner in the CRS consortium Worldspan, Delta didn't begin developing its PARS CRS until five years after its competitors got started. Delta lost some business to American and United as a result of being shut out of the newly emerging distribution system. Today, however, it is advancing quickly because its core systems and new products are based

A more hospitable front-end would let agents easily access customer information. The ultimate friendly interface would allow customers to bypass the agent and paper ticket altogether.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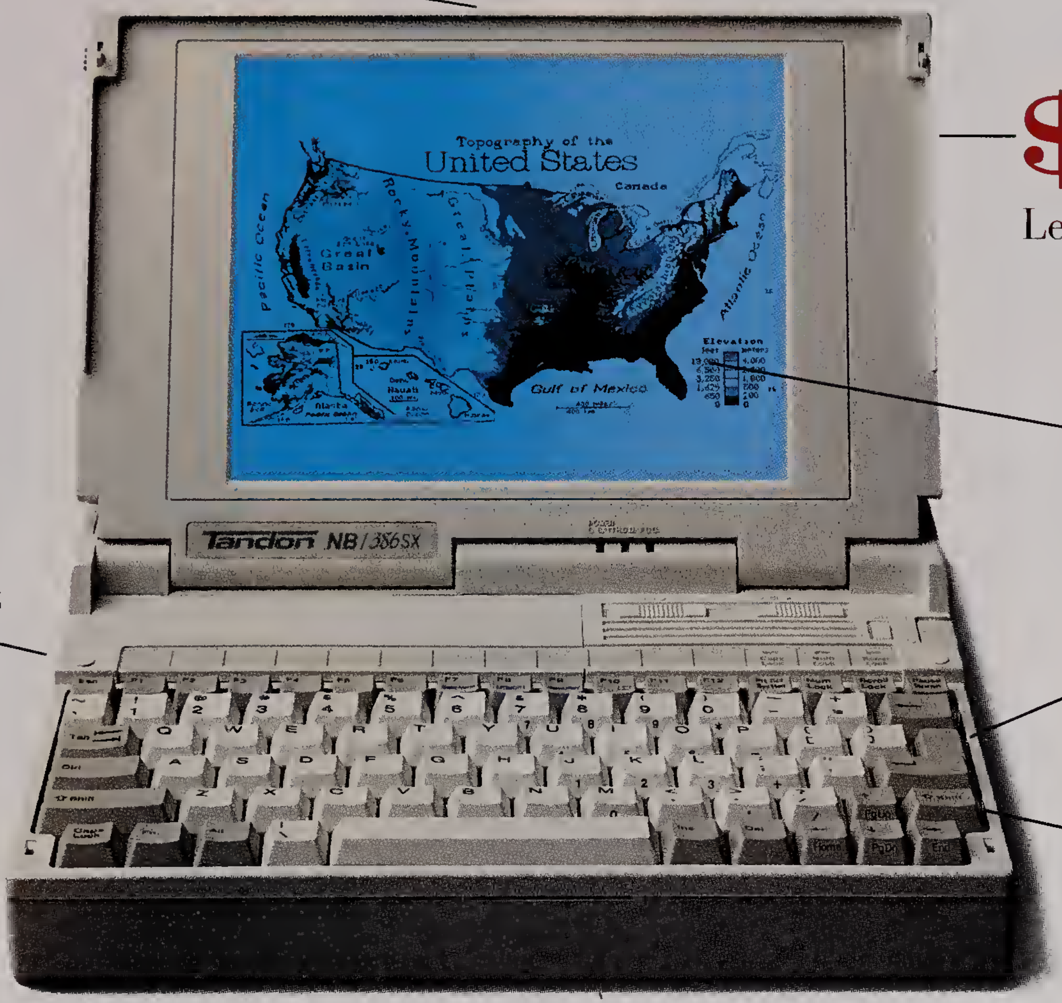

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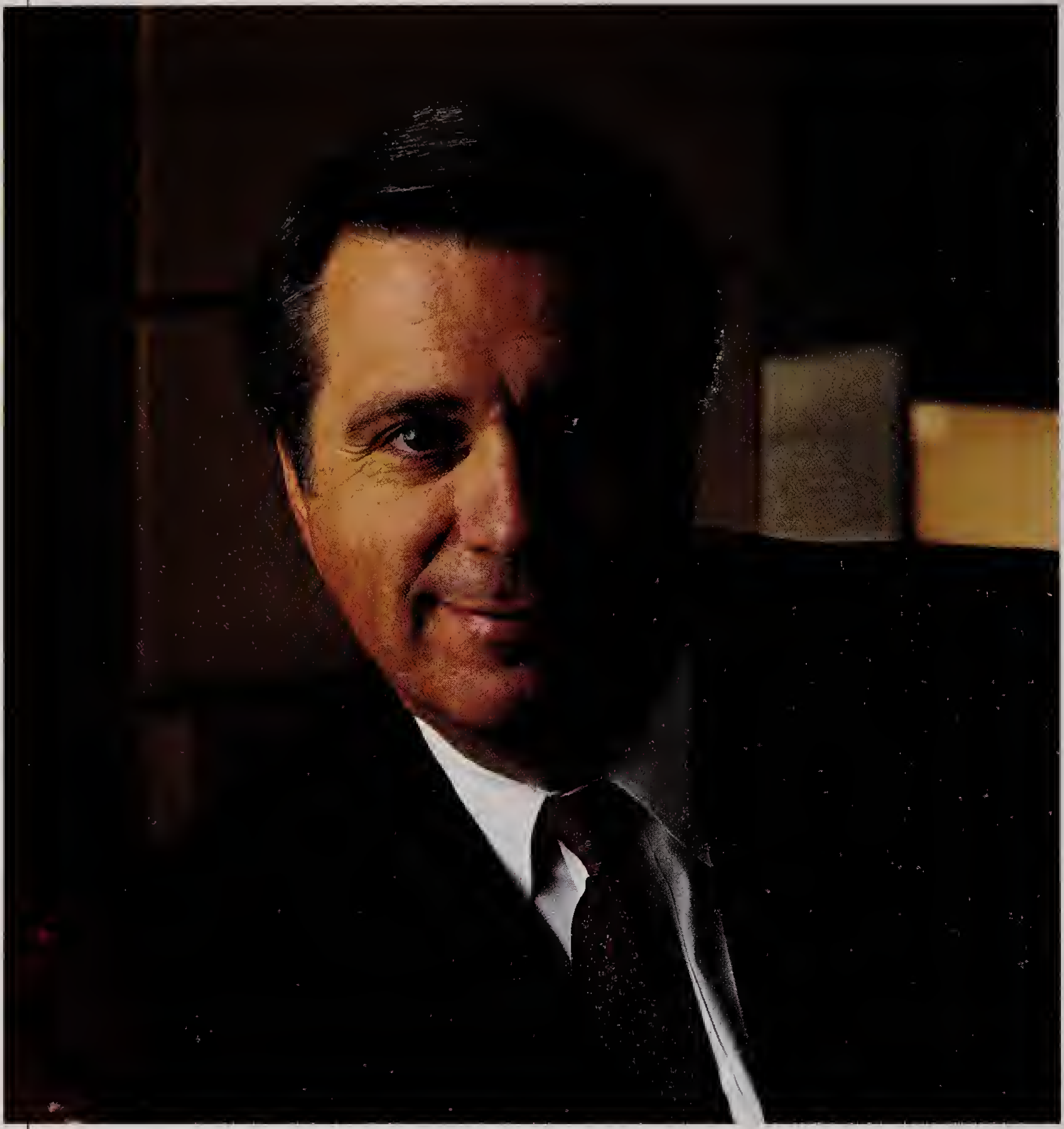


BLOSS: *"It's not going to be the CRS guys who are anxious to change. In fact, I would expect them to be barriers."*

PHOTO BY EUGENE MOPSIK

on flexible, high-level languages that are easier to integrate with intelligent networks.

In the past, Delta has worked with travel agencies on products that gave the agencies a choice of keeping their reservation systems on Delta's mainframes or on their own networks. Delta now supports industry standards that would allow agents to dial directly into each airline's reservation mainframe, regardless of whose system they're using. Such a capability would improve the reliability of reservation data available to the travel agent and would speed the reservation process.

Like Delta, Alaska Airlines is building relationships with its primary distributors in order to improve its market share. The airline has created a package-tour application linked to its CRS that lets it organize flight, hotel, car and activity packages for agents who need to book trips in cities on Alaska's Pacific, Southwest and South American routes. The packages save the agents legwork and, naturally, include flights on Alaska Airlines, thus increasing ridership in the vacation market. A small minicomputer lets Alaska create and customize many packages with very few people.

High front-end functionality and sophisticated customer service applications are still a few years down the road for many airlines, but the movement toward better service supported by information is gaining momentum. "Ten to 20 years ago, the applications owned the terminals," said Northwest's Kotar. "You used dumb networks and you hopefully had sophisticated customers. Today customers are getting clearer on what they want."

"Over time, you're going to see the airline marketing departments get more sophisticated in their requests for how they want to serve a customer [using technology]," said Del Bloss, president of Unisys Corp.'s Airlines and Communications Systems Division in Blue Bell, Pa. "It's not going to be the CRS guys who are anxious to change. In fact, I would expect them to be barriers. It's going to be the marketing guys, and you will see the application of technology in a much different sense than we have today."

> **"Over time, you're going to see the airline marketing departments get more sophisticated in their requests for how they want to serve a customer using technology."**
>
> *–Del Bloss*

* * *

Will the move toward distributed technology eventually pull CRSs along with it? "I don't think it will happen in my lifetime," said Kotar. "Those systems are so large and complex, [it's] better to take pieces and extract them. The demands on the airlines for IT are so great that nobody is able to justify taking scarce resources from something that works and redoing it when you have whole areas that still need technology.

"Next to airplanes, we probably spend more money on computers than anything," Kotar said. "Historically, we've looked at these business requirements as *automation* projects. Really what they are are process changes to the business that automation can help facilitate." CIO

CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

CONFERENCE PREVIEW

MONTEREY, CALIFORNIA
SEPTEMBER 22-25, 1991

People
Productivity
Profit

Workforce Diversity

Competing on Leadership Alone

People-Centered Productivity

The New American Paradigm

Time-Based Competitiveness

Rapid Technology Exploitation

Solving the Workplace Skills Crisis

And More
(see Table of Contents)

TOM PETERS

When "Getting It Wrong the First Time" Pays Off

© 1991

CIO

CONFERENCE OVERVIEW

Joe Levy and Lynda Rosenthal

PEOPLE: THE KEY TO COMPETITIVENESS

Businesses, regardless of their size, must develop and retain a high quality work force to stay competitive.

AGENDA

Session topics, presenters, times and scheduled activities are outlined.

COMPANION PROGRAM

Bring your companion. He or she will join you in conference receptions and meals while enjoying independent activities in the Monterey area.

DEL MONTE GOLF COURSE TOURNAMENT

Lush, scenic and gentle greens are the only way to describe the oldest golf and challenging tournament course west of the Mississippi.

CONFERENCE HOSTS

Select industry innovators in IT products and services will have a display/demonstration area during the conference.

MONTEREY PENINSULA

A spectacular coastline and history, museums, shopping, wineries and fine dining make this area a wonderful destination.

ENROLLMENT FORM

Coin & gear photo, Jim Scherer
Tom Peters photo, courtesy The Tom Peters Group

Conference Overview

The need for a conference addressing the issues of work place literacy, work-based learning, ethnic diversity, and skill competencies has been underscored by President Bush's recent headline-making pronouncements regarding the education and work force crises in America. It is now critical for companies to develop a new corporate agenda to address these issues before they further encumber America's global competitiveness.

American companies are facing a new reality in the labor force. Jobs are changing faster than workers' ability to perform them. Moreover, our educational system is failing. The quality of education in America is being decried in articles from the *Harvard Business Review* to the front page of the *Los Angeles Times*. These dual trends are causing private sector companies to compete not only on product reliability and value, but also as employers. Is computer technology the solution or is it part of the problem? What can the CIO do to ensure that IT helps to avoid the crisis in the work place?

Can IT help manage an ethnocentric work force, make work more satisfying and motivating for workers, and decrease employee turnover while increasing worker productivity? Participants in the next *CIO Perspectives* conference will hear from private and public sector leaders who are successfully administering IT-based programs aimed at addressing these and other issues. Clearly, corporations and the public sector will have to develop a new corporate agenda which includes work-based learning programs designed to create a work force with an acceptable level of literacy skills.

These issues, and the role of the CIO and other corporate change agents in resolving them, will be explored in Monterey, California, September 22nd–25th. At the next *CIO* conference, **IT and the Corporate Agenda: People, Productivity and Profit**, participants will investigate current and emerging seminal issues from business, technological, societal, ethical and legal perspectives. In keynote, general and concurrent sessions, informal dialogues, and a variety of idea sharing opportunities, conference participants will examine how these matters affect their organizations.

If safeguarding your organization's competitiveness in the '90s and well into the next century is important to you, we invite you to join us in Monterey. And we invite you to bring other senior executives concerned with these issues. This is the *only* conference designed to give you practical ideas to help solve the work place skills crisis in your organization.

To guarantee your attendance at *IT and the Corporate Agenda: People, Productivity and Profit,* simply mail your completed enrollment form or fax it to us at 508/872-0618, attention Lynda Rosenthal. Or call toll-free 800/343-4935, extension 4631 (in Massachusetts, 508/935-4631).

Joseph L. Levy
President & Publisher
CIO Publishing Inc.

Lynda Rosenthal

Lynda Rosenthal
General Manager
Executive Programs

"Most senior executives are feeling the discomfort of a paradigm shift. For years we believed that technology was the key to competitiveness. It is becoming clearer that while technology is important, corporate culture is more important. It is evident that the key to competitiveness both for our nation and our corporations is a culture that focuses on education and improving workers' skills. CIOs who harness IT in support of this new culture will find themselves playing an increasingly important role as this paradigm shift unfolds."

Michael Behar
President and CEO
University Communications, Inc.

People

THE KEY TO COMPETITIVENESS

For years, technology has been viewed as a key to a company's competitiveness. U.S. companies have invested billions of dollars in computers and networks that crunch and carry huge amounts of information at lightning speeds all over the world. But many companies are finding that none of it works without a key ingredient: a high quality work force.

Index Stock

Over the last decade, companies have gradually discovered that their workers lack many of the skills needed in the Information Age. New York Telephone Company had to test 57,000 applicants to find 2,100 who were qualified to become operators and repair technicians. IBM, after installing millions of dollars worth of computers in a Burlington, Vermont, factory, found it had to teach high school algebra to thousands of workers before they could run the machines.

The inadequacy of the American work force to handle the jobs of today, much less tomorrow, puts a heavy burden on American business. "These skills deficiencies are costing American business monetarily, through waste, lost productivity, increased remediation costs, reduced product quality, and ultimately a loss in competitiveness," declared a 1988 U.S. government report.

Superstock

Building A Quality Work Force

For example, one Florida manufacturing company has estimated that it could save up to $1.2 million a year if its employees had stronger math and reading skills, says the report. The poor math skills mean employees waste materials because they have trouble measuring. The poor reading skills keep workers from reading blueprints correctly, thus forcing the plant to redo orders and pay overtime.

The problem is the result of the confluence of several changes. The U.S. work force is becoming increasingly diverse, with more women and minorities entering the work force than white males. At the same time, the nature of work is changing: This presents unique organization and management situations that businesses must respond to. Unlike the Industrial Age, which required workers to perform manual, repetitive tasks, the Information Age calls for workers to do intellectual and varied tasks. But the U.S. educational system has not only not kept up with these skill changes; it has declined in its effectiveness to educate the population to even minimal levels. And to top it all off, the number of new workers available is shrinking because of a drop in birth rates that began in the 1960s.

Superstock

The makeup of the U.S. work force is undergoing dramatic change. With this increasing diversity comes a number of challenges for corporate America. And because employers will be desperate for skilled workers, qualified entrants will be in a position to make demands. For instance, three quarters of working women are in their childbearing years. With more women entrants in the job market, corporate help with child care may become a requirement in order to attract the best talent. With the U.S. population aging, companies will not only need to give their employees time off to care for elderly parents, but may also try to entice those elders, many of whom have good skills, back into the work force. With more immigrants coming into the labor pool, instruction in English as a second language may become a necessity. With more blacks and Hispanics in the work force, the need for corporate-provided education will increase, for these two groups have the highest school drop-out rates in the country, according to *Business Week* magazine.

Index Stock

A Different Skill Set

Concurrent with this shift in the makeup of the workforce has come a shift in the nature of work. Technology has caused an upgrading in the level of skills required in jobs. In today's corporations, computers do many of the repetitive tasks once performed by people. Middle management has been slashed and decision-making power is being pushed down in the organization to the lowest levels. Workers are being asked to direct themselves and to make decisions based on complicated information that is provided to them by computers.

Thomas Bailey, a senior research associate at Columbia University, has called this trend the "upskilling" of American jobs, meaning a change from learning based on observation to learning acquired through symbols, both verbal and mathematical. Today's factory worker, for example, must understand statistical process control theory and be able to read charts and graphs that track manufacturing quality levels. If something goes wrong in the process, he or she must have the communication skills to explain the problem, and the reasoning skills to suggest a solution.

Few employers are finding workers with those skills, says the government's report on work force quality. Two-thirds of the employers consulted assessed the current pool of entry-level applicants as being insufficiently prepared in basic skills. "In addition to the three Rs, business noted that today's jobs require skills, attitudes, and abilities generally thought of as needed at the supervisory and managerial level. Businesses, regardless of location, size, or type, consistently noted deficiencies in such areas as problem solving, self discipline, acceptance of responsibility, reliability, initiative, teamwork, and the work ethic. Specifically, in countless conversations, employers reiterated a need for young people to be able to figure out what they need to know and how to find that information. Above all, they note that employees must be able to think their way creatively through tough problems."

And the problem will only get worse. About 90 percent of all scientific knowledge has been generated in the last 30 years, and this pool of knowledge is expected to double again in the next 10 to 15 years, according to the Commerce Department. "Future jobs will be restructured about every seven years and work and learning will be inseparable," predicts David Kearns, former chief executive of-

Motorola Starts a University

In its efforts to increase quality and productivity during the last few years, Motorola began putting more emphasis on training. In 1989, the company declared that by 1992 each and every Motorola employee would receive five full days of training annually.

But when the company began retraining its workers in new quality-oriented manufacturing methods, it had a rude awakening, according to William Wiggenhorn, corporate vice president for training and education. "They couldn't read. They couldn't do simple arithmetic like percentages and fractions. At one plant, a supplier changed its packaging, and we found in the nick of time that our people were working by the color of the package, not by what it said."

Thus, Motorola found that before it could train its employees, it would have to teach them math and English, says Jim Frasier, Motorola University's manager of retraining programs. The company set a goal that by the end of 1992, all U.S. workers would have to meet two criteria: the ability to read and write at the ninth grade level and the ability to do math at the eighth grade level.

These twin efforts, remedial education and lifelong training, were dubbed Motorola University in 1989. Susan Hooker notes that Motorola is deeply committed to lifelong training, and the company backs this commitment with an annual investment of $120 million in Motorola University.

The company is on track towards meeting its goals, says Frasier. Hooker adds that all the workers at three of the company's U.S. factories have met the criteria. In addition, the company has seen what kind of impact this upgrading of skills has had. Over the two-year period in which training has taken place, Motorola's cellular telephone manufacturing plant has seen a 30 to one reduction in cycle time (the time between placement of an order and delivery to the customer), a 10 to one improvement in quality, and a five-fold increase in the levels of employee productivity that had been predicted for the factory. These improvements were due to both training and to good workplace design, notes Frasier. Frasier says Motorola's investment in training and education will give the company a strategic edge in the 1990s. "People will want to work for us and to stay with us because we provide lifelong learning." ■

ficer of Xerox, who was recently nominated to be deputy secretary at the U.S. Department of Education.

A Lifetime of Learning

Thus, the issue is not just competing for the best people in an increasingly limited labor pool. Constant education and retraining of a company's current work force has become a key to competitiveness. While the 1980s was the decade of quality, during which companies focused on improving the quality of their products and services, the 1990s will be "the decade of people," says Jim Frasier, manager of retraining programs at Motorola University.

A few companies are trying to improve their workers' skills. Motorola was among the first to recognize the strategic importance of education and training, starting a corporate training center in 1982 that later grew to be Motorola University. Susan Hooker of Motorola University notes that 75 percent of Motorola's present work force will be with the company in the year 2000, and without a well trained work force, "we won't be in business."

Other corporations also recognize the importance of a well-trained work force. American Express' success with its Academy of Finance has given birth to a number of such academies in various industries. (See sidebars.) New York Telephone has set up four technology-learning centers where employee skills are upgraded.

These companies have realized that they have little choice but to invest in training and education to help their work force learn the skills that business needs. The alternatives, as listed in the government's report on the quality of the work force, are simply unacceptable:

- employ under-qualified workers, which could result in inferior product quality, thus reducing American companies' ability to compete in the global marketplace;
- competitively seek out qualified workers already employed in other companies, thus driving up the wage scales and reducing American companies' price competitiveness; or
- take the jobs elsewhere, thus reducing American job opportunities and eroding the U.S. economic base.

Superstock

But large expenditures to remediate and train workers should not be looked at as a cost, but rather an investment that is even more important than investments in capital equipment.

According to William H. Kolberg, president of the National Alliance of Business, "The last frontier of international competition, I submit, is the work force. It's the one component we can't export or import with ease and quantity. Those nations that build the best educated and trained work forces into internationally competitive skill forces, will draw the high-skill industries and thus enjoy the higher standards of living." Adds Kolberg, the way companies manage their human resources is becoming a critically important business strategy. ■

Agenda

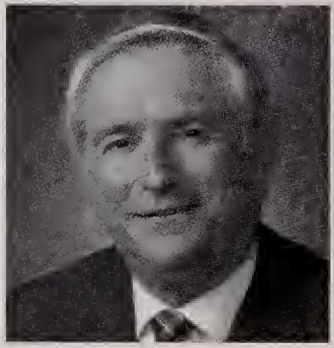
CIO PERSPECTIVES

Dr. Robert A. Zawacki

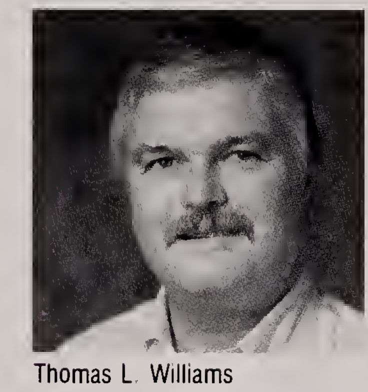
Alan R. Fusfeld

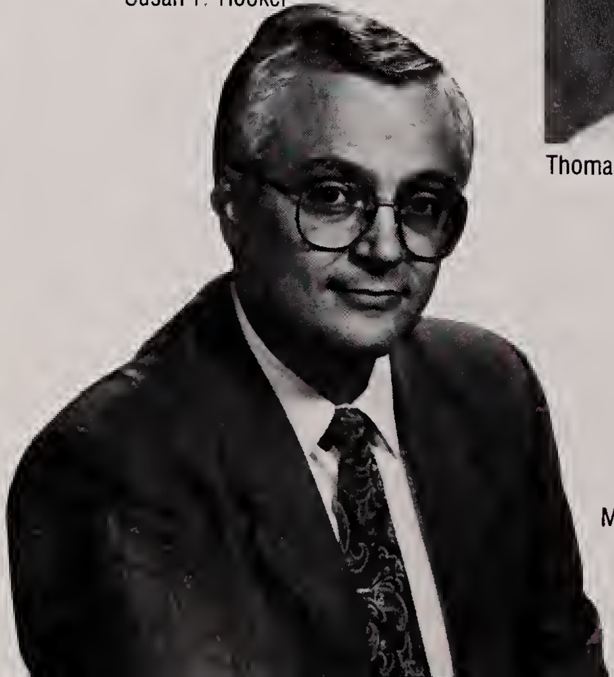
Raymond J. Lane

Mitchell Fromstein


John Roach

Susan P. Hooker


Thomas L. Williams


Michael Behar

SUNDAY, SEPTEMBER 22

2:00PM–6:00PM	Conference Registration
7:00PM–9:00PM	Reception

MONDAY, SEPTEMBER 23

7:00AM–8:00AM	**Continental Breakfast**
8:00AM–8:30AM	**Welcome & Opening Remarks** Joseph L. Levy, *President & Publisher CIO Publishing, Inc.* **Conference Overview** Conference Moderator: Alan R. Fusfeld *CEO, Generics North America*
8:30AM–9:15AM	**The Organization and Technological Change: The Human IS Response** Dr. Robert A. Zawacki, *Professor of Management & Organizational Behavior University of Colorado*
9:15AM–10:00AM	**Vegetables Before Dessert: Facing Up to IT Realities** Raymond J. Lane, *Senior Vice President Booz Allen & Hamilton*
10:00AM–10:30AM	**Coffee Break**
10:30AM–11:45AM	**The Next CIO Contribution: Solving the Workplace Skills Crisis** Panel Moderator: Michael Behar, *President & CEO, University Communications* Mitchell Fromstein, *Chairman and CEO Manpower, Inc.* John Roach, *Chairman, President and CEO Tandy Corporation* Susan P. Hooker, *Director of Planning, Retraining, and External Affairs, Motorola University* Thomas L. Williams, *President Elect California Council for Alternative Education*

IT AND THE CORPORATE AGENDA: PEOPLE, PRODUCTIVITY AND PROFIT

MONDAY, SEPTEMBER 23 (continued)

11:45AM–1:00PM	Luncheon & Presentation People-Centered Productivity: Turning Down Time into Dollars Graham C. Beachum, Jr., *Vice President & General Manager, Tandon North America*
1:30PM–6:30PM	Networking & Affinity Groups
6:30PM–7:30PM	Reception
7:30PM–10:00PM	Dinner

TUESDAY, SEPTEMBER 24

7:00AM–8:00AM	Continental Breakfast
8:00AM–8:45AM	Connections: The New Social Contract for the 21st Century Panel Moderator: Robert S. Russell, *Vice President, Marketing, AT&T Network Systems* Peter Moore, *Managing Partner Inferential Focus* Dan Stanzione, *President, Operations Systems AT&T Network Systems*
8:45AM–9:30AM	Forging Closer Bonds With Employees and Customers John W. Biggs, *Senior Vice President Hyatt Hotels Corporation*
9:30AM–10:15AM	The Formula for Productivity: Putting Information in Usable Form Peter J. Schuyten, *Editorial Director Dow Jones News Retrieval*
10:15AM–10:45AM	Coffee Break
10:45AM–11:25AM	How To Compete on Leadership Alone Stuart Reeves, *Senior Vice President & Member Board of Directors, EDS*
11:25AM–12:05PM	Concurrent Sessions (4) The Power Crisis and Its Impact on Computing Environments Joe Binder, *Vice President, Marketing Exide Electronics*

Graham C. Beachum, Jr.

John W. Biggs

Peter Moore

Stuart Reeves

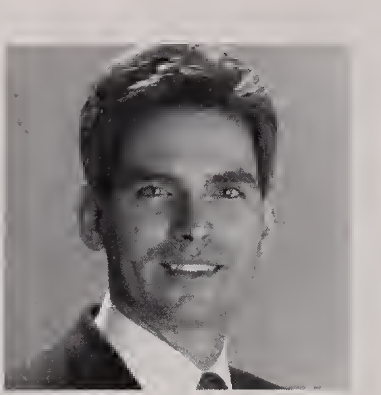
Peter J. Schuyten

Dan Stanzione

Joe Binder

Robert S. Russell

Agenda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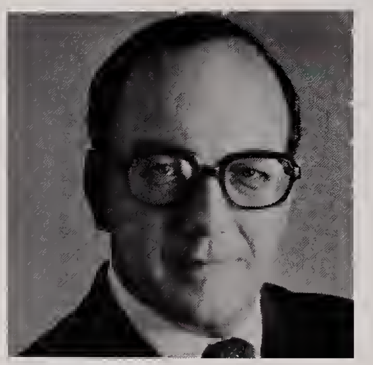
Fred Sammet

Alan Paller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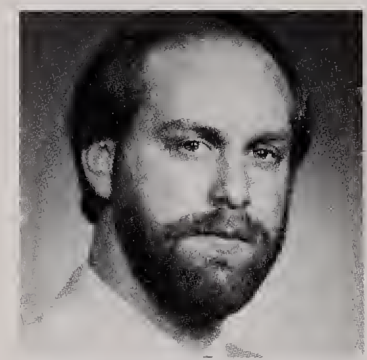
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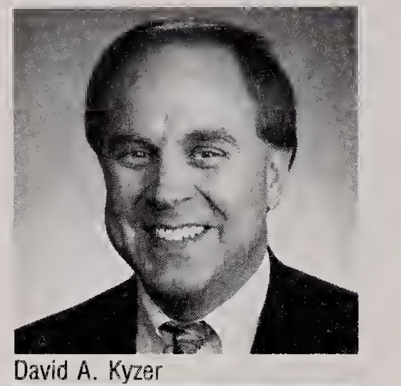
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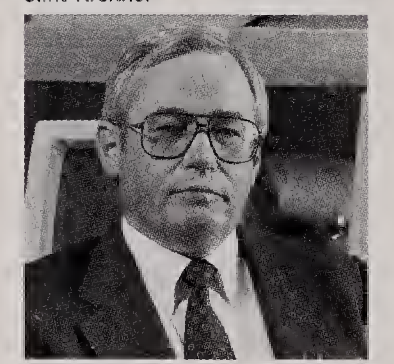
Clint Kreitner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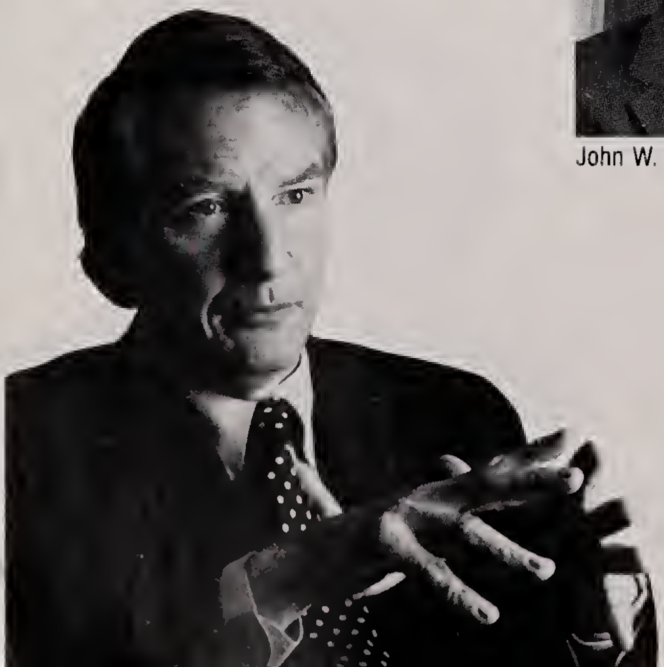

Tom Peters

TUESDAY, SEPTEMBER 24 (continued)

	Rapid Technology Exploitation Strategies: Profiting from the Open Systems Upheaval Frank Gens, *Vice President, Technology Assessment, Technology Assessment Strategies Corporation*
	EDI: Building Bridges, Breaking Barriers Jeff Brooks, *President, Brooks Associates* Fred Sammet, *President* *Interlink Resource Group*
	IT Value Leading to Enterprise Excellence David A. Kyzer, *Vice President of Development Consulting Services, EDS*
12:05PM–1:00PM	**Luncheon**
1:00PM–1:45PM	**EIS: Improving Productivity or High Tech Gadgetry?** Alan Paller, *President, AUI Division* *Computer Associates International* Clint Kreitner, *President* *Reading Rehabilitation Hospital*
1:45PM–2:30PM	**Information Technology: The Cornerstone of Time-Based Competitiveness** Lewis E. Platt, *Executive Vice President* *Computer Systems Organization* *Hewlett-Packard*
2:30PM–3:00PM	**Using Information Technology to Reengineer the Business Process** John W. White, *President, Information Technology Group, Texas Instruments*
3:00PM–3:30PM	**Coffee Break**
3:30PM–5:30PM	**Create and Destroy: When "Getting It Wrong the First Time" Pays Off** Tom Peters, *President, The Tom Peters Group*
5:30PM–6:30PM	**Reception with Tom Peters**

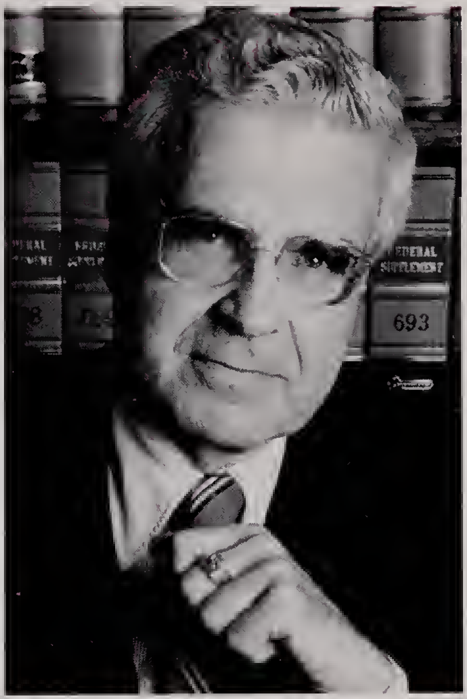
SEPTEMBER 22-25, 1991 HYATT REGENCY, MONTEREY, CALIFORNIA

WEDNESDAY, SEPTEMBER 25

7:00AM–8:00AM	**Continental Breakfast**
8:00AM–8:45AM	**Employee Privacy versus Corporate Privilege** Arthur Miller, Esq., *Bruce Bromley Professor of Law, Harvard Law School*
8:45AM–9:25AM	**Concurrent Sessions (4)**
	Open Systems: Beyond the Blueprint—Starting to Build William N. Bonin, *Director of Open Systems Development, Hewlett-Packard*
	CASE Trends and Impact Lawrence L. Howard, *Director, Worldwide Sales & Marketing, Advanced Information Management Division, Texas Instruments*
	Bringing Top Service to Your Bottom Line Al R. Mascha, *Vice President, Worldwide Customer Service & Support, Hitachi Data Systems*
	You Can't Work in the Dark: Sourcing Strategies for Enterprise Systems Management George Kurtz, *Senior Consultant, Computer Associates; Author, "You Can't Work in the Dark! Understanding Automated Data Center Operations"*
9:25AM–10:05AM	**Workforce Diversity: Successfully Managing Tomorrow's Team** Fred Hansen, *Executive Vice President Administration, Hitachi Data Systems*
10:05AM–10:35AM	**Coffee Break**
10:35AM–12:15PM	**The New American Paradigm: Developing a Creative Corporate Culture** Mike Vance, *Chairman & Co-Founder Creative Thinking Association of America*
12:15PM–12:30PM	**Summary**

TO ENROLL, CALL 800-366-0246

William N. Bonin


Arthur Miller

Lawrence L. Howard

Al R. Mascha

George Kurtz

Fred Hansen

Mike Vance

Companion Program

This program has been designed to provide activities for your companion while you participate in the conference. As you're attending the sessions, your companion can experience the surrounding attractions and enjoy the natural beauty of Monterey.

Registration in the companion program is required for those wishing to participate in the meals, planned functions, and/or tours during the conference. These include the Sunday night reception; Monday breakfast, lunch, tour, reception, and dinner; the Tuesday breakfast, lunch, tour, reception; and Wednesday breakfast.

Monday morning, a get-together for companions has been scheduled to meet new friends and renew acquaintances from the previous conferences. We look forward to meeting all of you (or seeing you again), and know that you will enjoy the program and activities.

David Burghardt, Island Photography

SUNDAY, SEPTEMBER 22	
7:00PM–9:00PM	Arrival Reception
MONDAY, SEPTEMBER 23	
8:30AM–9:30AM	Continental Breakfast
11:45AM–1:00PM	Luncheon with all Conference Participants
1:30PM	Bus will depart from Hotel Reception Center for Monterey Bay Aquarium, Cannery Row, Wine Tasting and Shopping at the American Tin Cannery
5:00PM	Return to Hyatt Regency
6:30PM–7:30PM	Reception
7:30PM	Dinner
TUESDAY, SEPTEMBER 24	
7:00AM–8:30AM	Continental Breakfast
10:00AM–3:00PM	Bus will depart from Hotel Reception Center for Monterey Peninsula Tour, Monterey Waterfront, Fisherman's Wharf, Pacific Grove Waterfront, 17-Mile Drive through Pebble Beach with a stop at the Lodge.
11:30AM–1:00PM	Luncheon, Plaza Cafe, Carmel
1:00PM–3:00PM	Carmel Mission Tour
3:00PM	Return to Hyatt Regency
6:30PM	Reception
WEDNESDAY, SEPTEMBER 25	
7:00AM–8:30AM	Continental Breakfast

Del Monte Golf Course

Old Del Monte is the oldest golf course west of the Mississippi. Built in 1897, its gentle greens make it by far one of the most beautiful courses on the Peninsula.

While the greens have since been redesigned, they maintain their challenge. Small greens, sand bunkers and narrow fairways lined with Monterey Pine and California Live Oak will inspire the most avid golfer.

Del Monte Golf Course is the annual site of the California Amateur Tournament, and has also hosted the Spalding Pro/Am Tour.

On Monday, September 23rd, we will host a shotgun start tournament. There will be three tournament holes—hole-in-one, longest drive, and straightest drive. There will also be awards for individual and team low nets, and individual low gross.

Participation in the tournament is $110 per player and includes the round, cart rental, use of practice tees, amenities and prizes. If you plan to play in the tournament, be sure to complete the information regarding your shirt size and golf handicap on the enrollment form.

Corporate Hosts

AT&T
Network Systems

AT&T Network Systems

As a major business group within AT&T, AT&T Network Systems is one of the world's leading developers and manufacturers of products and systems for telecommunications. AT&T Network Systems provides telecommunications service providers in approximately 70 countries with virtually everything they need to build and operate their networks. Product quality results from the unmatched research and development capabilities of AT&T Bell Laboratories, as well as the standards of reliability associated with Western Electric products.

BOOZ·ALLEN & HAMILTON

Booz Allen & Hamilton

Booz Allen & Hamilton is an international management and technology consulting firm committed to helping senior executives in the world's foremost corporations and institutions solve difficult problems.

COMPUTER™
ASSOCIATES
Software superior by design.

Computer Associates

Computer Associates International is the leading independent software company in the world. CA develops, markets and supports integrated systems management, information and business applications software for a broad range of mainframe, midrange and desktop computers. CA serves the international marketplace through offices in 26 countries.

DOW JONES INFORMATION SERVICES
The lifeblood of business.℠

Dow Jones Information Services

Dow Jones Information Services is the electronic publishing arm of Dow Jones & Company, Inc. Although formally organized in 1980, Dow Jones Information Services actually began more than a century ago with Dow Jones News Service (commonly known as the Broadtape). Today, Information Services publishes or produces four other realtime newswires; Dow Jones News/Retrieval, the leading on-line source of business and financial news and information; Dow Jones Voice Information Services (including DowPhone and JournalPhone); and DowVision, an information service that delivers customized business news and information through our high-speed network to desktops in corporate America. Dow Jones Information Services also produces syndicated business radio and television programming, and publishes portfolio management and investment software.

EDS
TAKE ADVANTAGE OF CHANGE℠

EDS

EDS is a leading provider of information technology services to businesses and governments worldwide. The company is headquartered in Dallas, employs more than 60,000 people and had revenues over $6 billion in 1990. EDS' services include consulting, systems development, systems integration and ongoing systems management.

EXIDE ELECTRONICS
Helping You Stay In Power™

Exide Electronics

Exide Electronics is the largest dedicated developer and manufacturer of on-line uninterruptible power systems (UPS) and services. The Company serves a broad range of businesses and institutions worldwide. Its power protection systems are used to safeguard mission critical applications in financial, medical, industrial, telecommunications, military and aerospace organizations — wherever continuous power is essential to daily business operations.

Hewlett-Packard

Hewlett-Packard Company is an international manufacturer of measurement and computation products and systems recognized for excellence in quality and support. The company's products and services are used in industry, business, engineering science, medicine and education in approximately 100 countries. HP has 92,000 employees and had revenue of $13.2 billion in its 1990 fiscal year.

hp HEWLETT PACKARD

Hitachi Data Systems Corporation (HDS)

Hitachi Data Systems Corporation (HDS) is a joint venture company owned by Hitachi, Ltd. and EDS. The company markets a broad range of mainframe systems, peripheral products and services. Headquartered in Santa Clara, California, HDS employs 2600 people and maintains more than 100 offices worldwide.

HDS
Hitachi Data Systems

Tandon Corporation

Tandon Corporation designs, manufactures, supports and services IBM-compatible business and professional personal computer systems marketed worldwide under the Tandon brand name. Incorporated in 1976, Tandon Corporation has been an integral part of the microcomputer industry since its beginning. Tandon has had three progressive growth phases: first, 1976–1979, as the world's largest producer of magnetic recording heads for disk drives; second, 1979–1985, as a leading supplier of complete disk drives for IBM, Tandy and other well-known personal computer makers; and since 1985 as a producer and marketer of its own brand name personal computer systems.

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Technology Investment Strategies Corporation, a subsidiary of International Data Group (IDG), offers clients worldwide a comprehensive set of research products and consulting services for both open systems and proprietary computing platforms. Our company is differentiated by a unique consultative approach, which emphasizes responsive client service and proactive consulting tailored to individual client business requirements. Services are designed to help MIS executives make informed strategic planning decisions and leverage their technology investments effectively.

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Texas Instruments is a high-technology corporation engaged in the worldwide development, manufacture, and sale of semiconductors, defense electronics systems, computer and software systems, electrical controls, industrial automation control systems, metallurgical materials, and consumer products. At Texas Instruments, technological leadership and a persistent commitment to quality have been the keys to success.

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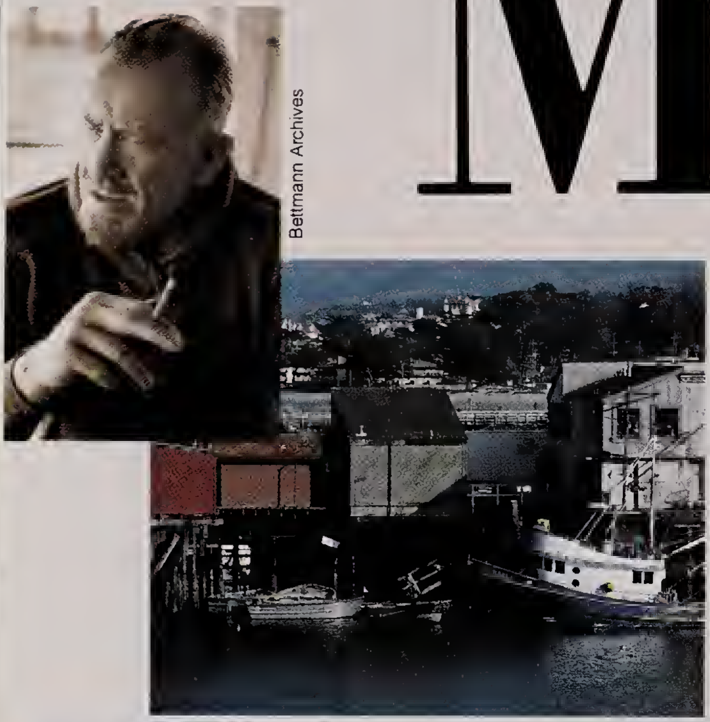
Recipient of the 1989 Malcolm Baldrige National Quality Award, Xerox is a multinational company in document processing. The business products and systems activities encompass the designing, developing, manufacturing, marketing and servicing of a complete range of document processing products and systems that make knowledge workers more productive. Xerox digital production publishing systems, copiers, duplicators, electronic printers, optical scanners, networks, workstations, and related products, software, and supplies are marketed in more than 130 countries.

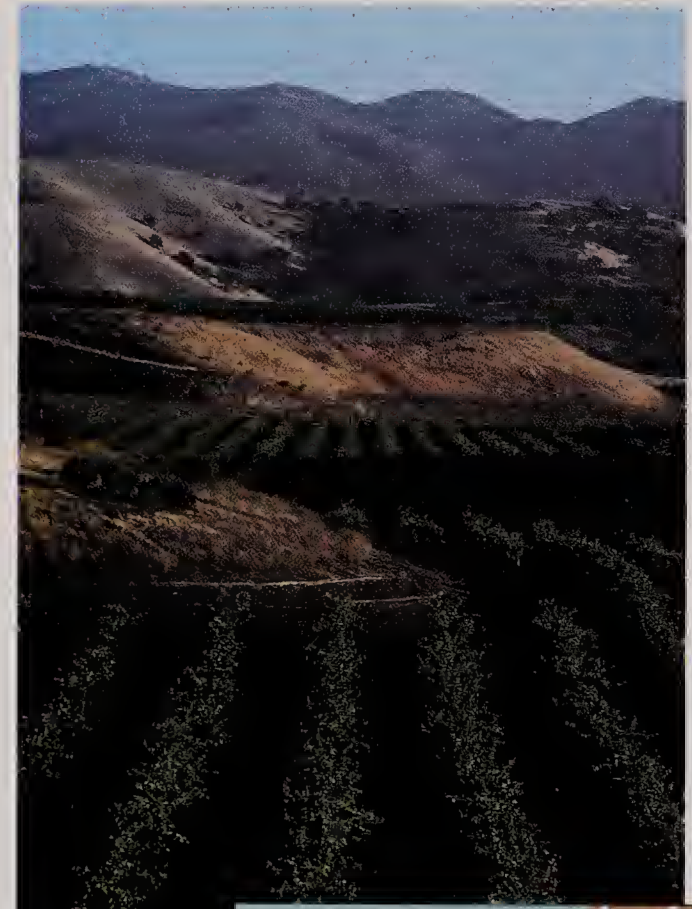
XEROX®

Monterey Bay Area Activities


Bettmann Archives

Monterey Peninsula boasts a spectacular coastline and over a 400-year history. Central to the whaling and sardine industries from the 17th through the 19th centuries, the Peninsula was an important part of the commercial, political and governmental lives of its inhabitants. Today the Monterey Peninsula is home to artists and poets, some of the world's most challenging golf courses, historical explorations, exquisite scenery, museums, wineries, shops and fine dining.

Immortalized by novelist John Steinbeck, Cannery Row was once the world's sardine capital. In the late 1940's the sardines disappeared, but a decade later Cannery Row was revitalized. Fine restaurants, art galleries, antique shops, nightclubs and specialty stores are housed in the former sardine processing factories. The American Tin Cannery, home to 45 factory outlets, is the finest outlet shopping in the area. Fisherman's Wharf is also rich in history and excitement, and a great location to watch the seals sunning themselves.

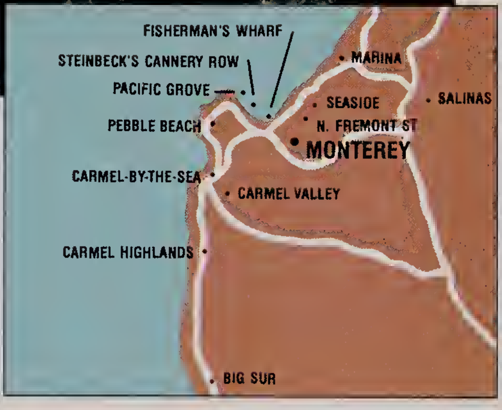

Craig Lovell, Eagle Visions

The Monterey Museum of Art is home for such artists as Edward Weston, Ansel Adams, Donald Teague and Charles Russel. In Carmel Village there are various art galleries such as Hanson Galleries, housing one of the most extensive collections of important modern paintings and rare prints featuring Picasso, Chagall, Miro, Dali, Rothe, and Neiman.

The Monterey Bay Aquarium is one of the largest aquariums in the nation. Its many galleries and exhibits explore the marine region of the Bay. You'll see otters, sharks, wolf-eels, starfish and the towering three story California Kelp Forest, the tallest exhibit in the United States.

Private winery tours and tastings will introduce the art of winemaking and the innovative methods winemakers are using to create distinctive wines from remarkable California grapes.

The 17-Mile Drive, perhaps the most scenic roadway in America, weaves through the residential community of Pebble Beach. Within this 5,300 acre preserve, protected and nurtured since 1919, are lush gardens and magnificent homes, as well as towering pines, cypress trees, craggy rocks and a spectacular coastline populated by seals, sea lions and otters.



Big Sur's majesty is awesome and inspiring. Pounding surf can be heard from cliffs 1,000 feet above the ocean floor. Nothing compares with the majestic view of the Pacific Ocean from Carmel River to the southern Monterey County line.

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Since it is our intent to create an informal, relaxed setting throughout the conference, casual attire is strongly suggested. California evenings can be cool, so we recommend that you bring a sweater or jacket.

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CANCELLATION

You may cancel your enrollment up to 30 days prior to the conference and receive a full refund. For cancellations made between 29 and 11 days prior to the conference there will be a $400 charge. If you cancel within 10 days of the conference or do not attend, no portion of the enrollment fee is refundable. All cancellations must be made in writing. Also, it is your responsibility to cancel your hotel accommodations and transportation arrangements.

HOTEL ACCOMMODATIONS/ TRANSPORTATION

A block of rooms has been reserved for conference participants. We urge you to make your reservations early with the Hyatt Regency at 800/233-1234 (within CA, 800/824-2196). Be sure to identify yourself as part of the *CIO Perspectives* conference to receive the conference rate. Hotel reservations/cancellations and charges are your responsibility. Shuttle transportation will be provided by the hotel to/from Monterey Airport and is included in your room charge.*

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Please indicate arrival and departure plans below:

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GOLF TOURNAMENT

A shotgun start golf tournament on the renowned Del Monte Golf Course will be held on Monday afternoon. The cost to participate is $110 and includes the round, cart rental, use of practice tees, amenities and prizes. If you wish to participate, complete the following:

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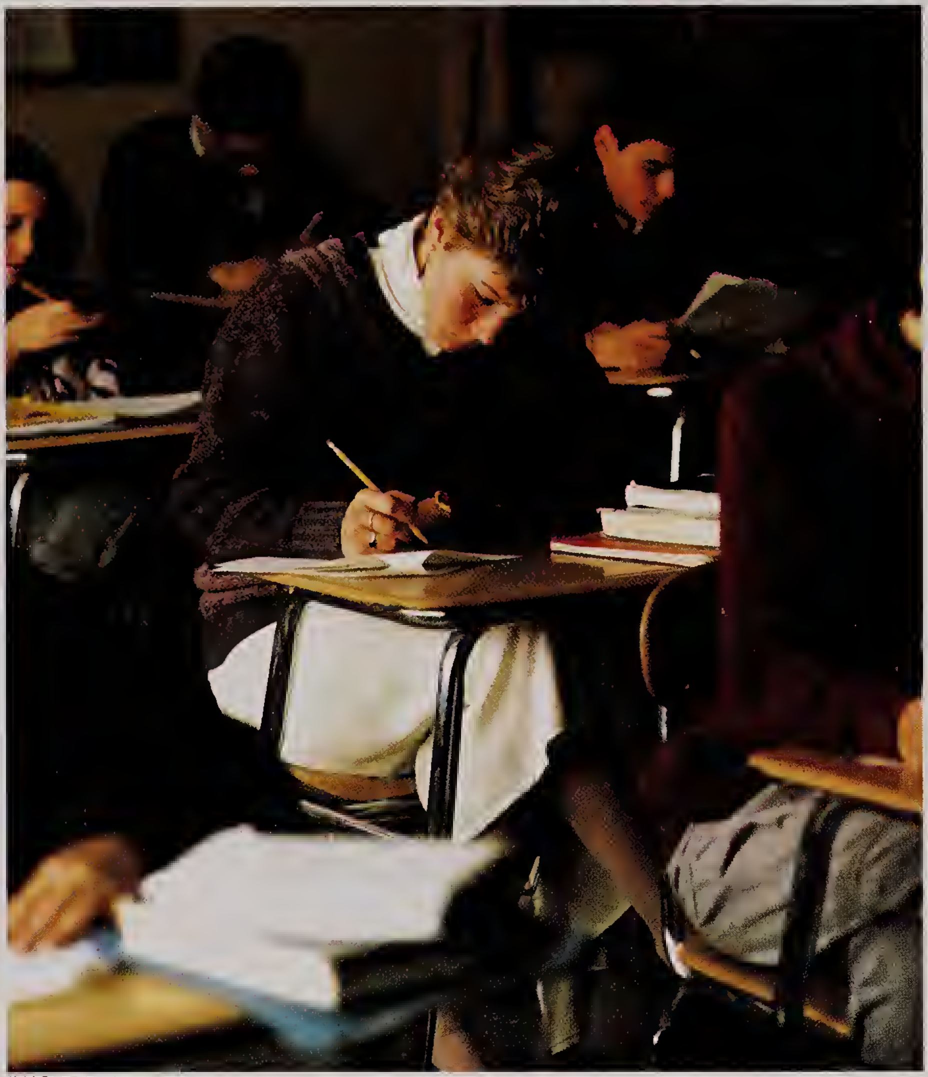


IMAGE BANK

Academy Concept Flourishes

As more and more companies have recognized the growing skills shortages in their industries, they have begun to band together to offer training and internships to high school students in an effort to recruit and prepare new entry-level workers. The National Academy Foundation, a non-profit organization, was founded in 1989 to encourage and support these efforts. The Foundation grew out of the success of the Academy of Finance, which was started in 1982 by American Express Company, Shearson Lehman Hutton, and the New York City school system. The Academy is a two-year program combining class-room instruction with on-the-job experience for high school juniors and seniors. In addition to their regular classes, the students take courses in economics and finance and attend seminars. Between their junior and senior years they work as paid interns at financial services firms.

Today, the Academy of Finance is in 45 schools in 22 cities, with a total enrollment of more than 2,600 students. The National Academy Foundation has since started academies in three other industries: travel and tourism, public service, and manufacturing sciences. For more information, contact the National Academy Foundation, 660 Madison Avenue, Suite 1804, New York, N.Y. 10021; phone 212-754-0040. ■

THE ENVELOPE PLEASE...

Information management's best and brightest get their moment in the spotlight

Creating visionary information systems requires CIOs to become extraordinary jugglers who can balance organizational politics with technical know-how. When these systems are implemented they can bring unexpected benefits to the organization and recognition of the importance of information systems.

Four years ago, American Management Systems Inc. and Carnegie Mellon's Graduate School of Industrial Administration began honoring the accomplishments of information executives by presenting Awards for Achievement in Managing Information Technology. Last month at a gala banquet in New York,

Fourth Annual Awards for Achievement in Managing Information Technology

BY JASON S. CASEY

PHOTOS COURTESY OF MCKOVSKY AND COMPANY

AMS and Carnegie Mellon presented this year's winners with Steuben crystal eagles and cash awards in recognition of their achievements.

Picked from nearly 200 entries, this year's winners were Richard A. Detweiler of Drew University, John F. Muratore of NASA's Johnson Space Center, John W. Turko of Kennametal Inc., C. Diana Whitehead of Pacific Bell and David M. Carlson of K mart Corp. Receiving honorable mentions were John K. Nagata of the Los Angeles Unified School District and James L. Zucco Jr. of MCI.

Richard A. Detweiler

Vice president and
professor of psychology
Drew University
Madison, N.J.

Richard A. Detweiler thinks the purpose of a liberal arts education is to teach tomorrow's leaders how to think, draw conclusions and make decisions. And he considers information technology a general-purpose tool for information exchange—"a tool for thinking," in his words.

> *"So much of what goes wrong in the world is caused by the failure to communicate. The network is a tool to enhance communication. It creates better relationships."*
>
> *–Richard A. Detweiler*

As a result of Detweiler's vision, Drew University provides every professor, undergraduate and graduate student with a complete computer system, including PC, software and printer. In 1983 Detweiler convinced the trustees to fund a $4.5 million "Computer Initiative" project; he went back to the well in 1987 for another $3.2 million to create the "Knowledge Initiative." The latter project established an elaborate voice/data network connecting students, professors, administrators and the school library. "These tools only make sense if everybody has access to all of the equipment all of the time," Detweiler said.

In the process of implementing these IT initiatives, Detweiler also forged relationships with vendors such as Bell Atlantic, DEC, Zenith and Intecom to support the creation of the network.

As a psychologist, Detweiler is interested in social change and how people can effect it. "So much of what goes wrong [in the world] is [caused by] the failure to communicate," he said. "The network is a tool to enhance communication. It creates better relationships among groups of people."

Apparently Detweiler's vision has captured the attention of the education community. More than 100 colleges and universities have contacted Drew to learn about the program.

John F. Muratore

Chief of reconfiguration,
management division
Johnson Space Center, NASA
Houston

For 20 years the information systems used by space shuttle flight controllers at the Johnson Space Center remained much like those used during the Apollo missions of the 1960s. Then in 1986 John F. Muratore, at the time a lead flight controller, began the drive to modernize these systems.

Muratore's efforts have taken NASA's ground support systems in an entirely new direction—one that is likely to make future control systems cheaper to develop and operate, as well as safer and more effective.

> *John F. Muratore's efforts have taken NASA's ground support systems in an entirely new direction—one that is likely to make future control systems cheaper to develop and operate, as well as safer and more effective.*

Under Muratore, the Johnson Space Center began replacing its mainframes with modern workstations, and its difficult-to-decipher event lights and displays of alphanumeric data with expert systems and computer graphics. So far, six systems have been created, and more are underway.

The first system completed monitors NASA's communications and tracking systems and alerts space center staff when problems arise. Other systems track the operations of the shuttle's main booster engines, its 38 attitude control jets and wind conditions at shuttle landing sites.

These systems share a distributed computing architecture consisting of off-the-shelf hardware, Ethernet communications systems and utilities for capturing and sharing data across applications.

The invaluable information provided by these systems has helped space center staff make better decisions. The booster expert system, for example, proved its worth during the first shuttle launch after Challenger, when one of the main booster engines shut down just prior to launch. The expert system was able to quickly pinpoint the problem, allowing the mission to proceed as planned. According to the lead flight controller, "The system paid for itself in that one launch."

John W. Turko

Vice president and director of
management information systems
Kennametal Inc.
Latrobe, Pa.

Once, Kennametal Inc. had no problem selling everything it manufactured. But as the market for cutting tools for the metalworking industry began shrinking a decade ago, the company had to look for other ways to increase its revenues. Despite Kennametal's 80 percent share of the industry's direct sales distribution channel, executives knew that the company's growth could only be sparked by developing a wider distribution network and new product lines.

"We were a manufacturer and only sold products we manufactured," explained John W. Turko, vice president and director of management information systems. "Now we are a manufacturer and a distributor." Today Kennametal has transformed itself from a product-driven to a customer-driven firm. The company now sells a variety of metalworking products through many channels, including catalog sales and telemarketing.

Chairman and CEO Quentin C. McKenna's enthusiastic support of IT allowed Turko and his MIS group to create its Integrated Supply strategy system, which is built upon electronic data interchange technology incorporating a relational database design. The database contains Kennametal's worldwide inventory and can be accessed by customers and company salespeople 24 hours a day. The system processes 440,000 transactions daily.

> *John W. Turko credits the EDI system for giving Kennametal the competitive position to be selected as sole provider of machine tools and related supplies for General Motors' Saturn production facility.*

Moreover, Turko credits the electronic data interchange system for giving Kennametal the competitive position to be selected as sole provider of machine tools and related supplies for General Motors' Saturn production facility.

Since installing the Integrated Supply strategy system, Kennametal has doubled its European market share and decreased its raw material inventory by 75 percent and its finished goods inventory by 50 percent. It is also able to ship 90 percent of its orders on the day they are received.

C. Diana Whitehead

Executive director of
systems planning
Pacific Bell
San Francisco

One of the riskier undertakings in the world of application development has to be the creation of a new user interface for customer service representatives. If the new system proves difficult, confusing or slow, the reps will be providing customers a disservice instead of service.

C. Diana Whitehead took that risk and succeeded. As executive director of systems planning for Pacific Bell, California's local telephone company, Whitehead conceptualized and championed the development of Gemstar, possibly the largest customer service system application ever deployed in the United States. Gemstar was initially deployed by 8,000 service representatives; because of their enthusiasm for the system, another 12,000 users will come on board.

The original goal of the Gemstar project was to create, for the first time, a uniform interface for all appli-

> *C. Diana Whitehead conceptualized and championed Gemstar, possibly the largest customer service system application ever deployed in the U.S.*

cations used by Pac Bell's service representatives. Standardization will allow the company to shift its customer inquiry load between business offices, eliminating geographic restrictions. In the future, Gemstar will also enable reps to automatically calculate rates and charges, indicate product and service availability, and sell additional services to customers.

Gemstar proved ground-breaking for Pac Bell in other ways. Whitehead used customer service reps themselves to set the system's requirements, the first time users were so employed at the company. Because of this the new application was quickly developed and won widespread acceptance among service reps.

Said Pac Bell's CIO, Jack Hancock, "Nothing I've seen in my career has had such a positive impact on the organizations I've been associated with."

David M. Carlson

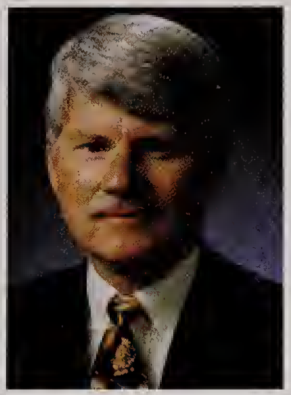
Senior vice president of
corporate information systems
K mart Corp.
Troy, Mich.

Discount retailers have to pinch pennies—lots of them—to survive. K mart Corp. has pinched more than most. According to its chairman, Joseph E. Antonini, K mart has knocked $200 million off its operating costs each year for the past three years. Antonini gives most of the credit to the retail automation program led by K mart's senior vice president of corporate information systems, David M. Carlson.

Under Carlson, K mart has built a state-of-the-art Unix-based corporate computing platform. K mart now runs one of the world's largest point-of-sale data scanning operations. The scanner data is collected by in-store computers, then transmitted by a VSAT data and video network to a central database.

The savings from online credit authorization alone is expected to pay for the entire VSAT network in two years. But the applications running off K mart's IS platform have also improved customer service, increased sales and reduced expenses. Scanning and online authorization have reduced customer checkout time by 23 percent. Systems enable K mart pharmacists to fill prescriptions faster and provide customers with their prescription history. A central merchandising system tracks sales, enables K mart's distribution center to replenish popular items in a single day, and helps buyers track sales trends. And the VSAT network broadcasts live video transmissions to the stores, allowing K mart to train sales associates across the country.

> *The applications running off K mart's IS platform have improved customer service, increased sales and reduced expenses.*



Honorable Mentions

John K. Nagata

Assistant superintendent,
information technology
Los Angeles Unified School District
Los Angeles

The Los Angeles Unified School District (LAUSD) is the second largest school system in the country, spread over 700 square miles, with a $4 billion budget, 800,000 students and 60,000 employees. Considering the potential here for rampant bureaucracy, the existence of a state-of-the-art network that communicates critical information for the system's day-to-day operations may come as a big surprise.

But John K. Nagata, LAUSD's assistant superintendent of information technology, has forged such a network, and more than 5,000 employees use it successfully. Built around five communications nodes, the LAUSD network connects 800 physical locations. The Payroll-Time Reporting System and the Student Information System keep the network humming: In the future it will support E-mail and office automation applications. LAUSD's personnel have been able to administer the district's policies and procedures much more uniformly now that all such information is online and updated as needed.

James L. Zucco Jr.

Senior vice president,
systems engineering
MCI Telecommunications Corp.
Arlington, Va.

MCI recognizes that new customer offerings can have a critical impact on market share in the competitive telecommunications industry. To support its growing roster of products, the company relies on James L. Zucco to develop and implement the necessary technology, hardware and capabilities.

Under Zucco's management, MCI has integrated multiple hardware platforms, enabling it to offer many of the services and features the company relies on to differentiate itself from competitors. Zucco's group has also enabled clients to access billing and service information directly through a terminal in their offices. By modernizing the applications architecture, Zucco reduced the information services time-to-market delays by 75 percent. He also oversaw the creation of intelligent networks that allow MCI's large customers to change the capability of their virtual networks in response to their changing needs. CIO

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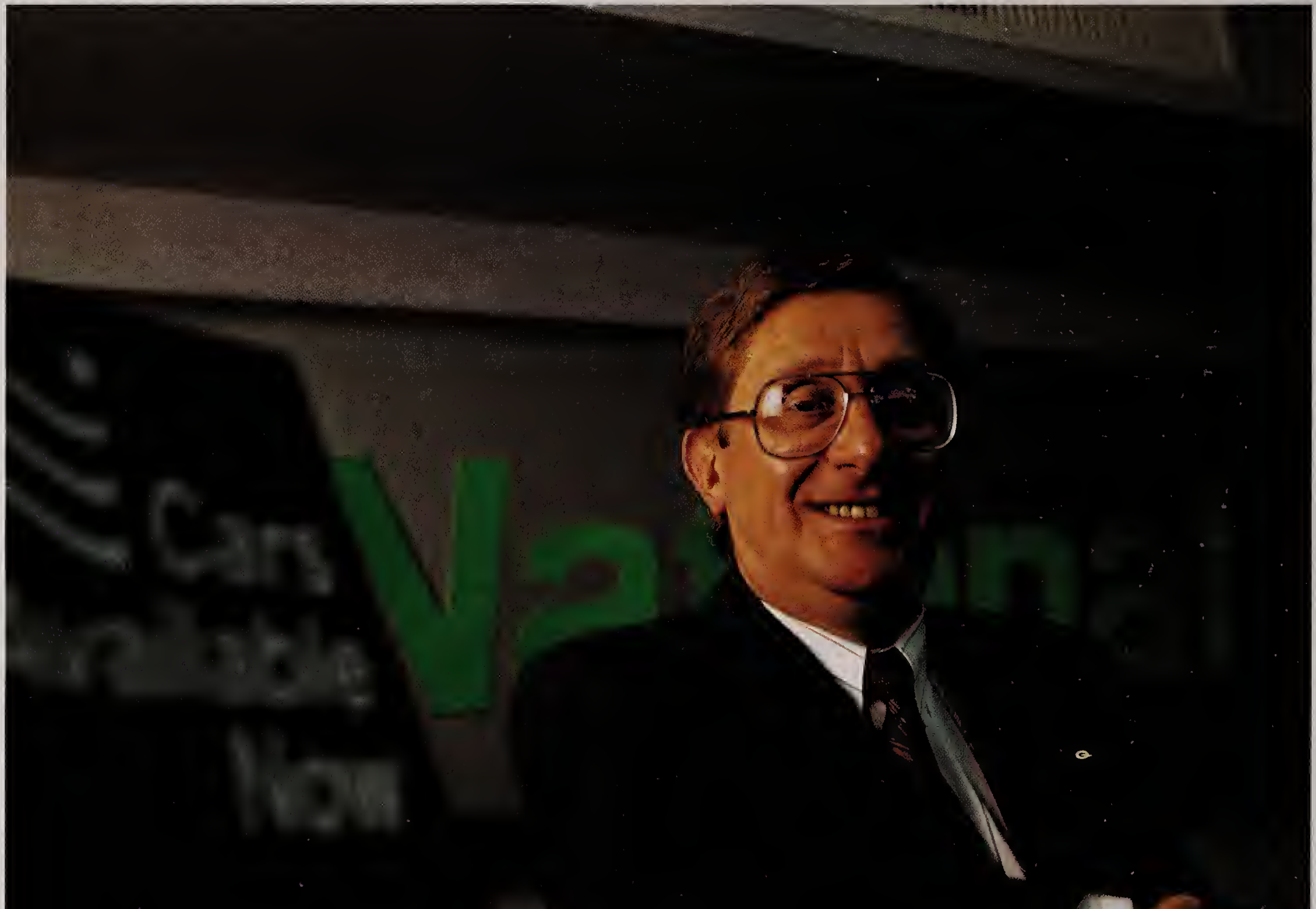
NATIONAL'S STEERING COMMITTEE

The partnership of National Car Rental's IT-savvy CEO and business-savvy CIO has produced a wealth of innovations that are helping the company compete in a cutthroat industry



VINCENT A. WASIK *(above) and* **JOHN D. LIVINGSTON** *(right) are "turning the full impact of automation loose on the car-rental industry."*

Rarely are a CEO and CIO as willing to share the driver's seat as Vincent A. Wasik and John D. Livingston of National Car Rental. At National there is no ambivalence about the importance of information systems or the leadership role of the CIO. "Any CEO who doesn't have the CIO as a direct-report is absolutely crazy," Wasik has said, and his partnership with Livingston bears out his words.

"I was very fortunate to find Jack," said Wasik, who is also National's chairman and president. "He's a competent businessperson first, with a solid technical background and a can-do attitude. People like this don't grow on trees." This combination of business acumen and technological prowess makes Livingston so valuable that he's National's second-highest-paid executive. The approximately 200 employees who maintain the reservations system report directly to Livingston, as do 10 data processing experts, including four vice presidents.

Livingston describes the car-rental business as "bloody" in its competitiveness and tight margins. But it is also an industry rife with opportunities for exploiting technology. Fortunately for Livingston—and National—CEO Wasik is a staunch advocate of technology who looks to new methods of automation and information processing as a means of achieving his goals.

Minneapolis-based National cur-

BY DAN RICHMAN

PHOTO LEFT BY JOE BERGER, PHOTO RIGHT BY JUDY OLAUSEN

rently ranks behind Hertz and Avis in the $8 billion dollar car-rental business. Wasik wants the company to become the nation's largest renter to business travelers and to tie the current leader for overall business. "The focus of my mission at National [has been] to use automation to provide maximum command and control over the assets and operations," said Wasik, adding that he plans to reduce the company's operating costs by 25 to 30 percent over the next few years—not by cutting personnel, but by increasing automation.

In that mission he has Livingston's complete support. "My job here is to turn the full impact of automation loose on the car-rental industry," Livingston said. "It's an industry that is completely susceptible to automation like no other in transportation. We will revolutionize car rental."

In a tough tone reminiscent of the days when he walked a beat as a New York City policeman (see related story, Page 78), Livingston described how he deals with counterrevolutionaries. "People know they can't come in here and say, 'no,' or, 'we can't,' unless they've got a whole body of knowledge behind them, because I'm not going to listen to them," he said. "If it's really 'no,' then fine, but otherwise I'm going to have to answer to Vince, and he's going to ask me the same thing: 'Why can't we do it?' He's convinced we can do anything."

National's commitment to high technology predates the arrival of both Wasik, whose investment group (together with Paine Webber) acquired the company in 1987, and Livingston, whom Wasik hired initially to assess National's computer power. Founded in 1947, National became a serious challenger to the two front-runners only in the early 1960s. While National is a privately held company, last year's revenues have been estimated at $700 million. And agreements with Tilden Rent-A-Car in Canada, Europcar (the largest car renter outside the U.S.) and Japan's Nippon Rent-A-Car have made National the largest global car-rental network, with 4,600 rental locations in 123 countries. (Tilden is already tied directly into National's reservations system; work to connect the other two companies is underway.)

> *"The focus of my mission at National has been to use automation to provide maximum command and control over the assets and operations."*
>
> *–Vincent A. Wasik*

The company's technological prowess has been an important factor in its growth. In 1967 National built the industry's first centralized billing and regional reservations systems, and two years later it created the first national centralized reservations system, according to company officials. Over the last few years Livingston and Wasik have expanded the already prominent role of computers at National. By comparison, Wasik said, "our competitors are in the Dark Ages. They're still carving pictures on the sides of their caves."

National's competitors naturally dispute this claim. But at least one analyst confirmed that the company is a strong contender in the technology wars. "Though I wouldn't say National is head-and-shoulders above the other companies in the car-rental industry, it is definitely at the forefront of technology," said Charles H. Finnie, until recently a research analyst who followed the industry for Alex. Brown & Sons Inc. in Baltimore. "Jack Livingston is spearheading that effort. I guess that makes him one of the most innovative CIOs in the industry."

Part of the computer-based innovation at National is an offering called Emerald Aisle, that does away with lengthy, multicarboned rental agreements. To use it, renters must first join the Emerald Club, which costs $75 a year. Members supply detailed billing and corporate information; that data is encoded onto a credit card and compiled in a database used to promote new rental programs. "Even our marketing is driven by our own technology," Livingston said. "Our power is in databases."

Emerald Aisle lets renters proceed from an airport gate directly to the National lot. There they choose any car and drive to a booth, where an attendant will pass their Emerald Club card through a reader and check their licenses. After that, they just drive away. This technology is in place at most major U.S. airports.

Frequent renters can also use Smart Key, an ATM-like terminal that allows them to choose cars from a touch screen. Currently in place at about 50 airports, Smart Key guides the renter through several questions, prints a contract, then releases the keys from a jukebox that holds 61 sets.

PHOTO COURTESY NATIONAL CAR RENTAL

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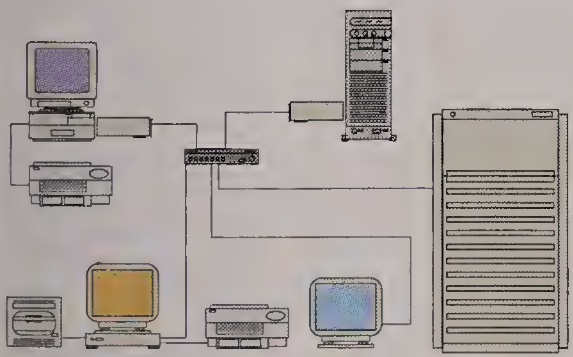

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Smart Key is one example of the successful partnership between CIO and CEO: Livingston and Wasik developed it together, and now Livingston calls it the best business decision he's made at National. "For this industry, this is pure innovation," he said, "and the potential of this machine hasn't even been touched." Currently in development is a feature that will allow Smart Key machines to relay phone messages to renters.

> *Part of the computer-based innovation at National is an offering called Emerald Aisle that does away with lengthy, multicarboned rental agreements.*

Livingston's worst decision? Passing up the opportunity to automate Car-Temps Rent-A-Car, National's longer-term rental company, when Wasik urged it several years ago. "Now it's still hanging over my head," he said.

Plans for National's future include stationing RF (radio frequency, or wireless) computers at the entrance and exit gates of every National car lot. Like the readers that scan freight cars as they roll by, National's computers will augment the company's fleet management system by helping to track cars' whereabouts and to determine whether they're due for maintenance or sale.

Livingston and Wasik have other ideas, including a computerized spare-parts inventory system that will reduce repair-shop time to a maximum of three days. In conjunction with that system, National could provide General Motors, its main source of cars, with more detailed repair records than anyone else in the world, since it is larger than any single dealer, Wasik said.

Also in the works is a computerized system to match retail buyers of retired rental cars with the make, model, mileage and color of their choice. By expediting the transfer from National's rental fleet to a buyer, the system would reduce the period during which a car was not generating income, thereby increasing profitability for National.

Under a program scheduled for rollout soon, National would guarantee a car's availability within 15 minutes after a renter's request; customers experiencing a longer delay would receive a free day's rental. Another guarantee program would lock in rates as long as one year before a rental. Neither of these programs would be possible without a highly efficient, centralized computer system, Livingston said.

Finally, National wants to lead the way in creating a coordinated reservation system closely linking the "big three" aspects of business travel: air travel, hotel stay and car rental.

IT's Finest

When a Gotham flatfoot gives up the NYPD for a DASD, you get one streetwise CIO

John D. Livingston is not your typical chief information officer. A tall, trim native of the New York borough of Queens with intent, pale blue eyes, 52-year-old Livingston looks like the ex-Marine and former New York City police sergeant he is. His accent is strong and his speech is forceful. Yet he blends that force with business savvy and technical know-how.

Livingston attributes his success as a CIO to the early realization that "computers have no value to anybody unless they're doing something that's paying the bills." It was a lesson he learned back in 1969, during the period when he was helping to build the New York Police Department's computer system,

EMERALD AISLE *direct plane-to-car service puts frequent renters on the road in less time.*

PHOTOS COURTESY NATIONAL CAR RENTAL

after five years of walking a beat.

"We were in information technology," he said, "but before that we were cops, gun-carrying cops, and if something happened out on the street, they shut down the better part of the building and we went out and became cops again." Livingston started working with the NYPD's computers as a data entry operator. From there he moved to operations, then to system programming, and then to database management. Within 10 years he was pretty much running the place, he recalled.

Livingston's experience as a law officer has proved useful in the mean streets of the business world as well. Matthew P. McGuire, National's vice president of marketing automation, pointed out that Livingston's years walking a beat have made him an "amateur psychologist," skilled at negotiating with his colleagues. He also possesses the forcefulness that is essential in police work, and that has helped him to achieve his goals. "He puts on the tough-cop exterior when he needs it to get the job done," said Michael Olsen, a National spokesman. "It's just one of his tools."

Although Livingston could not have predicted when he started out as one of New York's finest that he would end up pounding a keyboard instead of a beat, his foresight is demonstrated by his early understanding of the need for CIOs. "Even 20 years ago, information technology was getting so complicated that the people who needed the technology couldn't communicate with those who were building and maintaining it," he said. "I realized in the '70s that there was a growing communication gap between technology and business. The person to cross that gap had to come from technology, not from business. It's a lot easier to train a technical person to be a businessman than vice versa."

Does he miss life as a policeman? "Nah. My work there was valuable to my work here; it put things in perspective, taught me that everyone has a unique point of view. And anyway, things are tough in business, but so far no one here has threatened to break my legs."

–D. Richman

The potential for automation in the car-rental industry is limitless, Livingston believes, because the business is so number-intensive. "We track hundreds of thousands of assets, each worth $15,000," he said. "We do forecasts of how many cars we'll need, where, when, at what rate, for what period. All of these numbers can be forecast."

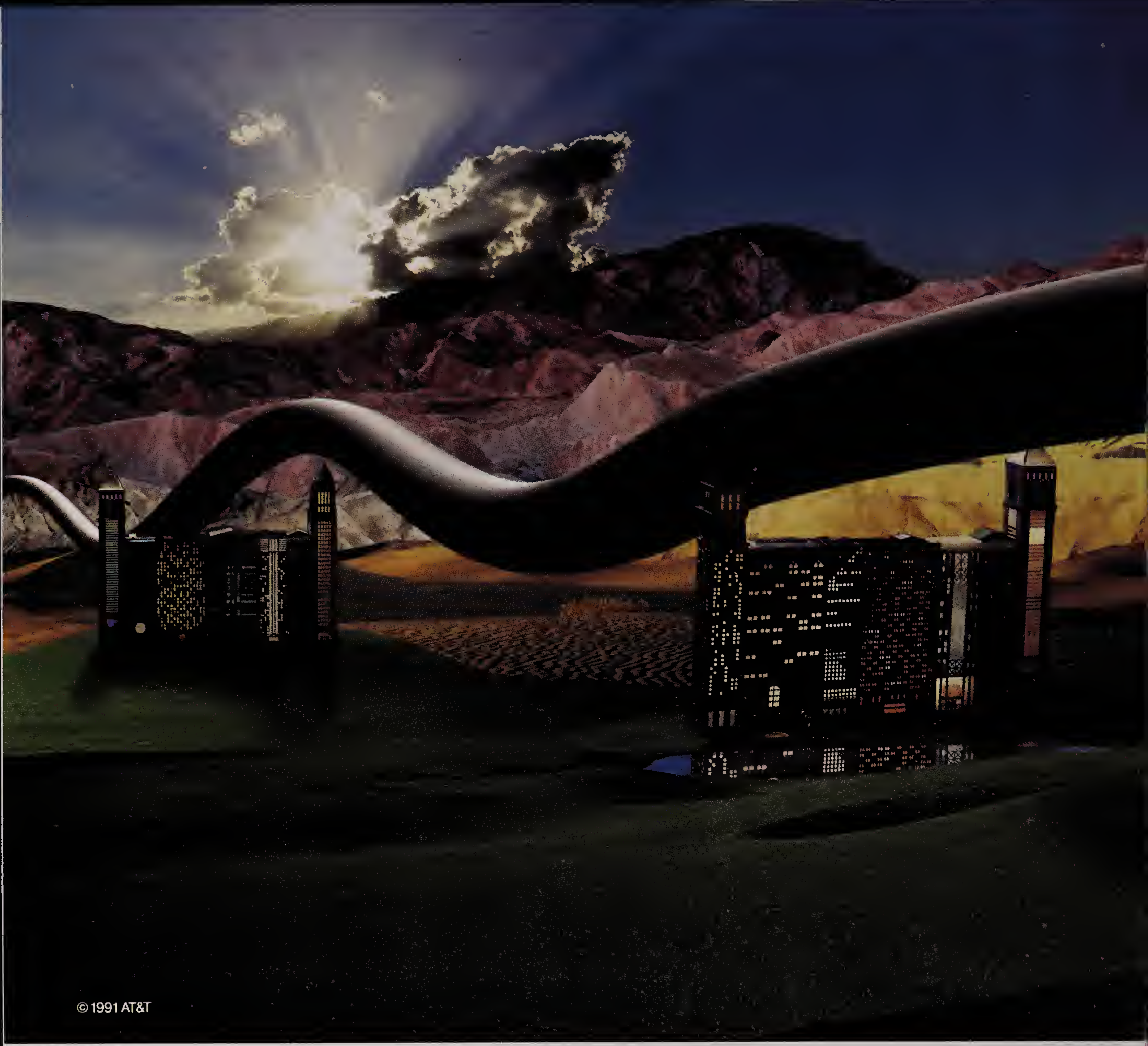
Livingston added that the company has already taken "multiple millions" of dollars of costs out of the system by improving its forecasting. Perfecting the ability to alter forecasts on an ongoing basis in real time will save even more, he said.

Easing the way for these ambitious plans is the agreement National made with EDS Corp., of Dallas, in December 1990, under which EDS will manage all of National's data processing and communications. The $500 million, 10-year contract will free Livingston from midnight phone calls and staffing worries, since the 200 people in National's data processing force have now become EDS employees, and all of National's hardware is now owned by EDS. It will also let National "double or even triple" its computing capacity without buying hardware or training and maintaining additional staff, Livingston said.

While many would perceive this move as giving away National's competitive advantage, Livingston says he is not concerned. On the contrary, he hopes EDS will market to National's competitors the hardware and software that National developed for its own use. In Livingston's mind, what benefits the industry will benefit National.

National wants to lead the way in creating a coordinated reservation system closely linking the "big three" aspects of business travel: air travel, hotel stay and car rental.

"If we can centralize, say, our reservations systems, all sharing one, we can take $20 million away from the phone companies," he explained. "If we each save $5 million, what do I care? We'll shift the competitive battle over good service to where it belongs, at the airport, and we'll abso-



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NATIONAL CAR RENTAL *was born in 1947 as an association of independent operators.*

PHOTO COURTESY NATIONAL CAR RENTAL

"Anyway, by the time someone else gets our ideas, I'm going to be leapfrogging myself. There's a natural progression of putting systems in, and if you're very cautious and you're not sure of yourself, you tend to follow that progression. Well, I do end runs and leap over things."

> *"This isn't a shy business. Many programmers are shy, but they've got to get over that. They've got too much valuable information to give."*
>
> *–John D. Livingston*

The agreement with EDS gives Livingston more free time to participate in the business side. Far from resisting his CIO's involvement in enterprisewide strategy formulation, Wasik said that if Livingston continues to generate practical business ideas, he may be given an increasingly important role in that area.

This emphasis on the business as well as the technical aspects of the CIO position is the essential ingredient in Livingston's recipe for success. "For every hour you spend in technical stuff, spend half an hour in finance and half an hour in business administration," Livingston advised those who would climb the corporate ladder toward a CIO slot. "Learn what your company does, why and how. Tell them how they can work better with what you know about their computer system. And I can almost guarantee that they will pluck you out of wherever you are and put you in a position of responsibility."

And be bold, Livingston suggests. "This isn't a shy business. Many programmers are shy, but they've got to get over that. They've got too much valuable information to give."

Wasik is one CEO who is highly receptive to such new information and ideas, according to Livingston. "Normally in business, the information guru has to prove return on investment, and a lot of time and effort is spent, and at the end it's out of date and wrong," Livingston said. "Here, I can come in and say, 'I know this is going to produce value. It'll take me two months to prove it to you, or I can go out and do it.' I think so far we're batting about a thousand." CIO

Dan Richman is a freelance writer based in Chicago.

TECHNICAL PROFILE

National Car Rental is a privately held company operating approximately 1,000 locations in the United States. National also has agreements with Tilden Rent-A-Car in Canada, Europcar and Japan's Nippon Rent-A-Car, making it the largest global car-rental network, with 4,600 rental locations in 123 countries. Last year's revenues have been estimated at $700 million. In December 1990 EDS of Dallas began managing all of National's data processing and communications.

Large and Mid-Range Systems: Two IBM mainframes, a 3090/200E and a 3090/300s, reside at National's headquarters in Minneapolis, handling the company's centralized reservations system, the financial management system and the fleet system, which tracks every car's whereabouts and condition. Also running there are Emerald Aisle and Smart Key, which are directed by National's proprietary software. Tilden Rent-A-Car is tied into National's central reservations system. In a few years the company will need IBM's biggest mainframes, according to CIO John Livingston.

End-User Computing: National has over 5,000 devices connected to its data center over a 56KB leased-line network. These include IBM 3270 terminals, PCs, printers and other peripherals.

Software: Mainframe operating system software consists of IBM's MVS/XA/ESA.
National also uses IBM's PR/SM (Processor Resource/System Manager) and CICS (Customer Information Control System). Databases are maintained in DB2.

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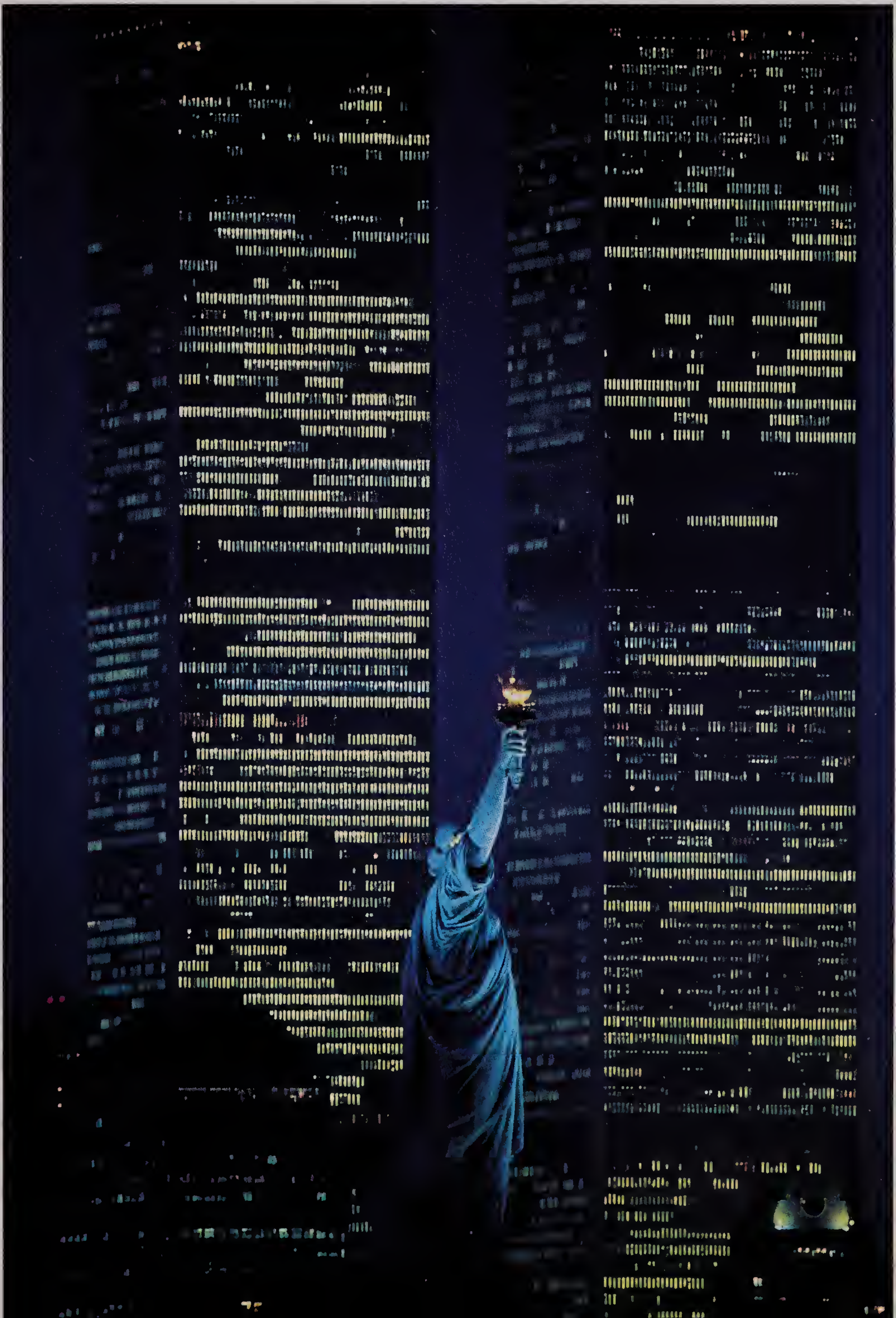

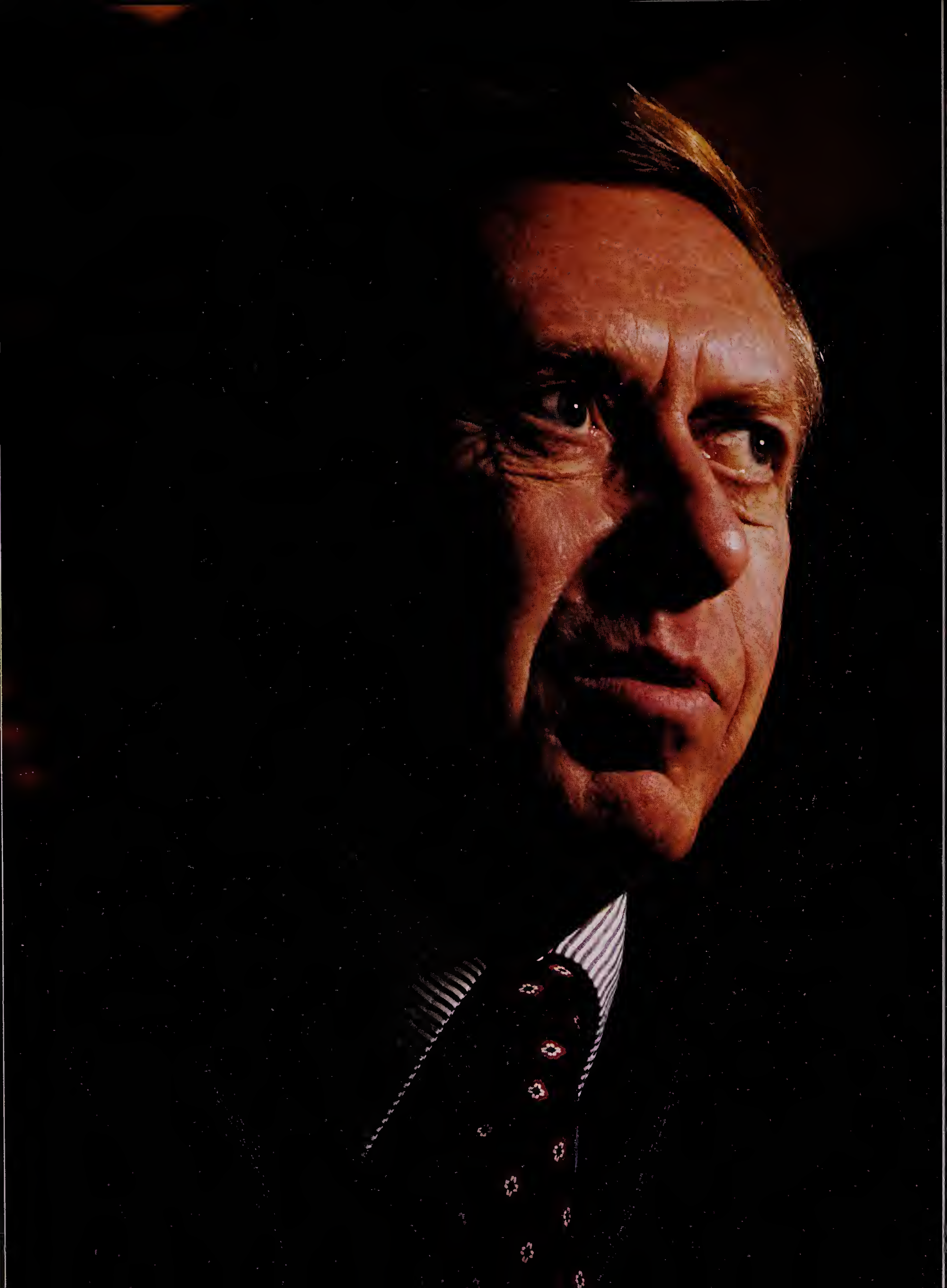

DIEBOLD NEW WORLD

As the preeminent prophet of information technology, John Diebold combines futuristic vision with a pragmatic sense of where business opportunities lie

BY THOMAS KIELY

John Diebold has a knack for predicting the next and the novel in technology. Chairman of a Bedford Hills, N.Y.-based consulting firm that bears his name, Diebold coined the term "automation" and described the automated factory long before it existed. He predicted distributed computing in the early 1960s, and neurocomputing later that same decade. By the 1970s, Diebold had already begun to spell out the ways that information technology would subsequently transform the operations of newspapers and publishers, banks and insurance companies, manufacturing plants and Wall Street.

For Diebold, though, prophecy is neither a black art nor a supercomputer-generated statistical estimate. It is a tenor of mind, a way of analyzing his corporate clients' business opportunities. The Diebold Group Inc., after all, does not compete with Jean Dixon. Diebold's firm (which he started in 1954, soon after earning his MBA from the Harvard Business School) focuses on the business and organizational issues related to information technology—and in Diebold's mind, the strategic value of technology is a blend of today and tomorrow.

"If companies only focus on using technology that is available today," Diebold explained, "they must inevitably run just to keep up. You have to focus on a few years ahead. You anticipate what can happen, and you start now to position yourself."

JOHN DIEBOLD *at a Univac mainframe installation in 1964. Diebold coined the term "automation."*

PHOTO LEFT BY JOSEPH BERGER. OTHER PHOTOS COURTESY OF DIEBOLD GROUP, INC.

These days, for example, Diebold is attentive to a gaggle of technologies that could be incorporated into tomorrow's automobiles and highways. In his office, Diebold summarized what he understood about the technologies—known as intelligent vehicle/highway systems (IV/HS)—and expounded upon the possibilities they offered. Settling his long frame into his chair, sipping from a cup of tea, Diebold conjured up the future.

Imagine, he said, "the ability of a vehicle—by itself—to communicate with other vehicles, to communicate with the roadbed, and also to communicate with varying traffic analysis systems." An automobile outfitted with intelligent sensors and communications devices, traveling along a highway equipped with sensors of its own (such as advanced video recorders), and all of it linked to a central system, could help tomorrow's drivers anticipate traffic jams and take alternate routes.

"To get information to the driver," Diebold continued, "you could do that either by displays—such as maps—in the vehicle [or] the driver could get a beeping in the car, [with] a voice explaining what the problem is. We believe that digital cellular technology, which has enormous channel capacity, will probably be the technology that will be used to alert the driver."

Diebold's firm has been working with a number of clients, many of them in Europe, who are interested in IV/HS technology. "There is a lot going on in Europe in this," Diebold said. "There are already test operations going on in Norway and England. There is a large program called Prometheus in Europe, which is funded largely by private industry and with some European Community funding, that is focusing very much on the on-board systems on the vehicles." A few other European research consortia are peeking at other aspects of IV/HS.

Diebold is tall, fit and looks more like fiftysomething than the 65-year-old that he is. He has an air of elegance about him. He dresses stylishly, and all his movements are precise, direct. He listens intently in conversation, his head cocked slightly.

Asked to name clients that are investigating these smart-vehicle systems, Diebold grew vague, saying only that his firm is "assessing what the systems may be like, and assessing what the roles of various players in the development of IV/HS will be." But he added that one client, an automobile manufacturer, is already testing a remote diagnostic tool for routine auto maintenance. With this tool, an auto manufacturer can perform a car's 3,000-mile checkup remotely "while you're driving to work, and you won't even know it." If the manufacturer's computer detects any problems in the vehicle, the owner will get a letter in the mail. "We do a lot of work with automotive manufacturers," said Diebold, "and they anticipate that the value of the information systems on board a vehicle will be 25 to 30 percent of the value of the vehicle by the end of the 1990s."

Diebold is not intrigued by technology for its own sake. In his estimation, the real potential of technology lies in the business opportunities that it sparks.

> *"I think the entire environment is changing because of information technology."*
>
> *–John Diebold*

"You have already [display] maps as options on some cars today," he said, "where you can punch in the coordinates of where you want to go. The next step is that people in the hotel business, or the restaurant business, will want to advertise on those maps. Maintenance is going to become a more capital-intensive function rather than a labor-intensive one, because of the diagnostic opportunities. For fleets of cars, you could know where the cars are and communicate with the drivers directly, without waiting for them to call in. There could be substantial changes to all the industries related to this, [including] tourism, and how one distributes goods."

Diebold leaned forward. "This is very exciting. It is very similar to the early days of the computer industry." Opportunities abound for those who will build the equipment, design the systems, install them, operate them, sell information to the driver and so on. "It's really a very fluid situation, as to knowing what the roles will be of various players. It's all up for grabs."

Multimedia computing is another new field Diebold is scrutinizing—his firm works both for vendors and users of the multimedia gear. Diebold predicts that, increasingly, "the MIS field will be a visual field." That doesn't refer to the "crude graphics we have today," Diebold said. "Multimedia means high-definition, full-motion television and advanced audio technologies. That's where the real action is: having the interplay with the individual and the system, and having it aurally as well as visually. The visual element isn't thought about today as part of the information systems within an organization. But

DIEBOLD *in 1955, testifying before the 84th Congress on automation and technological change.*

it's going to change completely the way you handle your marketing organization, the way you interface with your customer, the way your maintenance organization interfaces with the organization."

Diebold confessed uncertainty about the exact business uses of multimedia. "I don't think anyone knows." The business uses of these nascent technologies will evolve willy-nilly through experimentation and innovation. "But clearly," he noted, "in marketing you can do a far more effective job if you can link—and custom fit—to the prospect lots of visual material as well as figures and words." The visual material could show specific features of a product, he said. And while images are already important today in architecture and manufacturing, the next step is full-motion video. This would allow, for instance, an architect's corporate client to drive around the neighborhood of a new building before the structure is ever built.

"Also, it could be [a] very important maintenance [training tool]," Diebold added. "There, you often have very complex problems, and the ability of a maintenance worker at a remote location to get a step-by-step guide to what they're uncovering" would be quite beneficial.

Multimedia will figure more prominently in employee training too. Such training, Diebold believes, will become more critical in the 1990s, as the workforce increasingly reflects the rapidly declining public education system. IBM, he said, is currently testing an employee-training application in its new multimedia division in White Plains, N.Y. The test program uses Tennyson's poem "Ulysses" as the heart of an interactive teaching machine. Students see the text displayed on a computer screen and can select exercises from a menu of options. "If you'd like to hear an actor deliver that line," Diebold explained, you select from among a list of actors and watch (and listen) to the actor deliver the line in full-motion video in a box on one-quarter of the screen.

A 1969 meeting of **THE DIEBOLD GROUP**, *a pioneering business and technology consultancy.*

Other actors interpret the line differently. "Then," said Diebold, "if you want to hear some academics discuss that line you can get a half a dozen options. You can get an individual professor saying it means this, and another one saying the reverse. If you're vague about the history of Greece around the time of Ulysses, you can get refreshed on that. So, you can cut back and forth, test stuff, and go through the whole poem. You're learning literature; you're learning history; you're learning acting [and interpretation]; you're getting a little bit of public affairs. It's intensely interesting, highly interactive—and it exists."

Diebold believes that technologies such as multimedia and IV/HS will soon redefine what society thinks of as its infrastructure. "By the end of the '90s, the way that we define the societal [infrastructure] will be in ad-

"OfficeVision fit our plans so perfectly, it seemed as if IBM had been reading our minds."

Frank Fitzsimmons
Director, Judicial Information Systems
17th Judicial Circuit Court of Florida

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Says Frank Fitzsimmons, Director of Judicial IS, "It takes a lot of information to move a case through the courthouse, and we're the ones who funnel it. The trouble was, the big end of our funnel was too big and too complicated. We had office software on one platform, and data on another. And the files—the clerk's, the probation division's, the jury room's and others—were set up differently."

The plan.

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The entire judicial system is now using OfficeVision, mostly on IBM PS/2®s, connected by Token-Ring LANs. Along with E-mail, calendaring and other office functions, it works with both DOS and OS/2® software, plus CICS applications in three regions on the host.

The present.

According to Mr. Fitzsimmons, users and the IS people have both come out ahead.

"It's made life easier for all of us. OfficeVision lets us integrate PC and host applications—across all regions of the mainframe—without making users log on and off all the time. Also, we can customize menus almost instantly. Users see only what they need, and training is easier. We have a help desk, but it almost never gets calls about OfficeVision.

"This place was a paper mill, but no more. And our ability to communicate with each other—remember, we manage the case flow of 65 judges—is vastly improved. Since OfficeVision arrived, we've continually increased our application portfolio and usage goes up 20% every year. That's because people are getting information faster and more easily."

The future.

Frank also has some thoughts on investment protection.

"In government, you buy things a little at a time. You can't upset the applecart too much. That's what's great about OfficeVision—it wasn't a shock to our system, it fit right in. We're running it with brand-new OS/2 machines and 10-year-old DOS PCs. And we're integrating applications that were written by independent groups around the county.

"And as an SAA application, OfficeVision gives me comfort for the future. There have been skeptics, I know, but SAA is real. It lets me look down the road and see around the corners, to know what'll be there.

"As I said, this is government. If you make mistakes, you live with them. For us, OfficeVision was no mistake."

To learn more about the 17th Circuit Court's OfficeVision installation, call IBM at **1 800 IBM-6676**, extension 857.

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dition to bridges and roads and the telephone system," Diebold said. "I think that we will define societal infrastructure in terms of information systems. I think the entire environment is changing because of [IT]."

Think of the rise of the Information Age as a kind of big bang in miniature: The computer behind the glass walls exploded, expanding first within the organization, and then going beyond the organization and throughout society. True to form, Diebold immediately turned to the business implications of all this. Information managers, he said, will increasingly "be concerned with the information environment not just inside the firm, but outside as well."

Electronic data interchange is one instance of this. "Inevitably," Diebold said, "[corporations will] have far more linkage of the [production] chain, right through the whole chain of relationships," from the suppliers of raw materials to the users of finished goods and services. But Diebold added a caveat: Just who should act as EDI's promoter and innovator "is an open question." Does the CIO take the initiative within his industry? Does he let someone else—such as banks—take the initiative? What criteria should he use in deciding when to participate and when not to participate?

"With EDI," Diebold continued, "there are hundreds of issues on liability. And who sets what standards? And what quality control goes into it? And what happens when the system doesn't work the way it's supposed to work? Those are all things the CIO ought to be looking at now, on a proactive basis, and not just waiting until someone comes along and offers to connect all this stuff. Is it to [the CIOs'] advantage to do EDI, or is it to their advantage to obstruct it?"

He paused before returning to his point. "So what I'm saying is that in addition to all the internal aspects of information systems [that CIOs must concern themselves with], the external aspects of [IT] are going to be important from now on—not just this decade, but from now on. Using technology, [companies] will be able to do a better job both of analyzing what customers need, and also of providing them more effectively with what they need." Technology will be the catalyst and vehicle for new products and services—not just a tool for improving the efficiency of yesterday's services.

Technology will be the catalyst and vehicle for new products and services—not just a tool for improving the efficiency of yesterday's services.

There is another twist to external information, Diebold added. "The Japanese are very good at gathering information," he mused. "They climb all over the market. They look at everything that's being done, and at every competitor, and they collect millions of photographs and books or films" about the market, their customers and their competitors. "And by having a much better understanding of what the customer needs are, and incorporating that effectively, out of all [of this] come very good products."

Diebold continued, "By some manner—by some calculus we do not understand—[the Japanese] take all this data and they integrate it. They find it possible to use it, and they do use it." CIOs in this nation need to learn that secret. Information—collected, drawn together, analyzed—"seems to me to be at the heart of the chief information officer [role]."

The CIO, Diebold contended, "may not only be responsible for how the external information is changing; it seems to me a CIO might take the initiative" to use information technology to create opportunity for the firm. "If you're a supplier to the automotive industry, it seems to me you ought to be focusing on the buyer of the automobile too. That might tell you a lot about what your customers are going to need," or even help to influence the customer's business.

Within the corporation, he went on, "I think the CIO has to be a facilitator. In many of these areas, it's not the CIO who has to discover the best [technology to use to] structure and test molecular interactions of drugs. You need to be sure that the researchers know what's available in that regard and have it. In many of these cases, it's a question of bringing to the attention of line officers information on what competitors are doing, what technologies are useful in performing a function, and raising questions. Can this [technology] be useful? Can it change what you're doing? I think the CIO ought to be constantly doing that: probing."

Most of the CEOs Diebold talks to are "not afraid of technology," he remarked. "Their concern is that technology might very well provide a way to do an end run in their industry," and they want to know how to wed creative thinking in their business with technological creative thinking. And they're not sure that the IS manager—fine fellow that he is—has enough grasp of the business to do this sort of creative thinking.

Creative thinking. Probing. Initiative. In Diebold's mind it all adds up to this: The CIO ought to be the corporation's chief entrepreneur. "The major pitfall [for the CIO] is in not using the imagination," he said. "If a company is well enough run, that ought to be an eject button. If the CIO is not doing imaginative things," the CEO ought to look for another one. CIO

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PEER PRESSURE

Companies trying to get a handle on costs might benefit from comparative analysis, in which costs are analyzed and compared to those of their business and technology peers

BY

KATHLEEN MELYMUKA

The CIO trying to keep an eye on costs may fare better if his or her other eye is turned outward. Some companies are doing this by engaging in comparative analysis, evaluating their costs in relation to those of their business and technology peers.

Comparative analysis breaks down the costs of certain components of the IS operation and shows how they stack up against the competition, highlighting areas that could stand improvement. It can also show precisely how a company would fare with an outsourcer.

While no one yet offers to comparatively analyze the entire IS operation, a number of organizations claim to have data centers and networks down to a science. Each of these firms offers its own approach. For instance, Compass America Inc., of Herndon, Va., offers an objective, quantitative analysis of corporate data-center and network cost-efficiency and quality. Using a minutely detailed analytical model that includes as many as 900 reference points, Compass measures the amount and quality of work accomplished by the hardware, software and personnel in each data-center and network function, the resources used and their cost. These are compared with a multi-industry, international "reference group" of top-performing companies, showing precisely where and how savings can be attained.

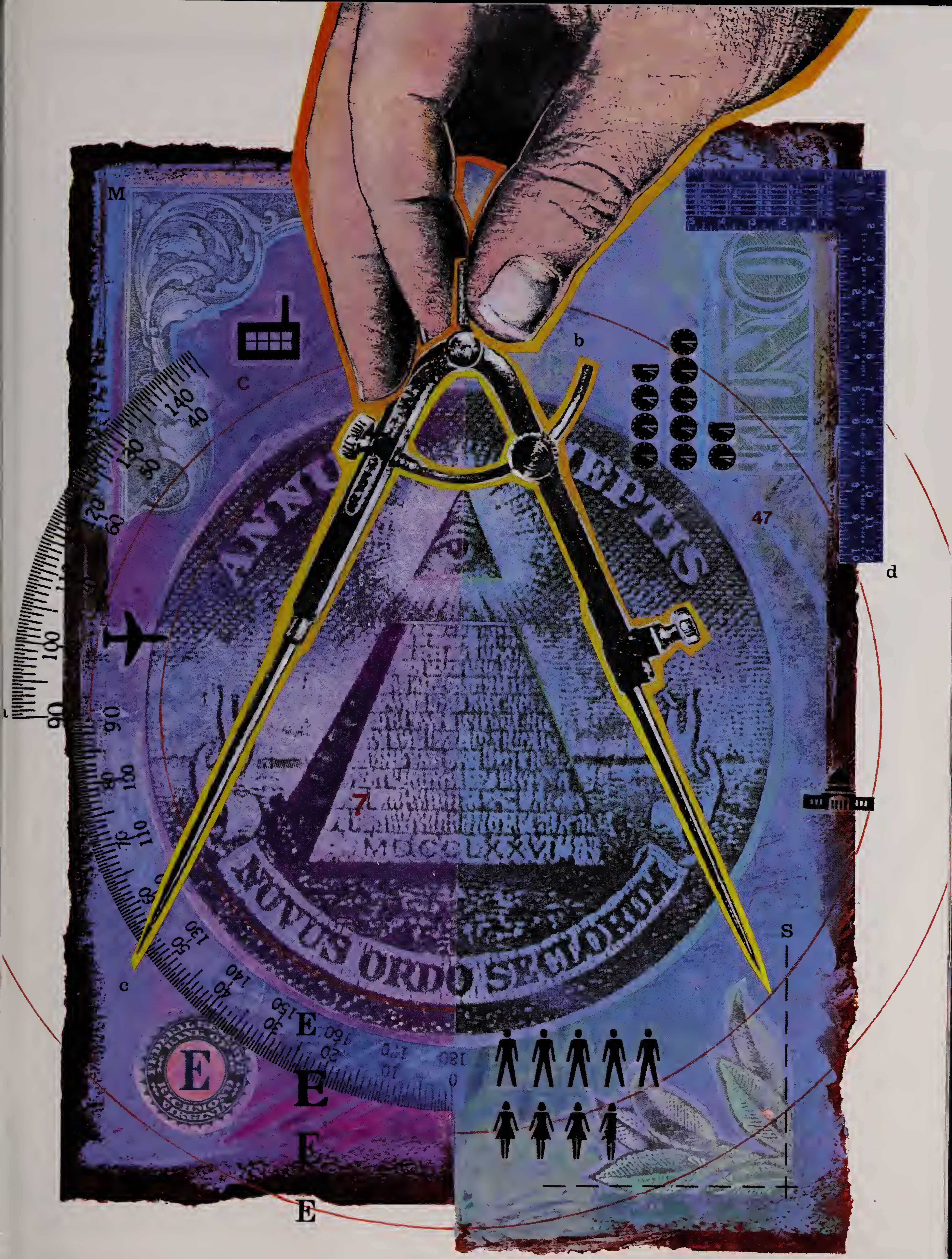
Compass divides data centers and networks by "actual" functional areas rather than by those that may just exist on paper, according to Thomas Blitz, president of Compass America Inc. and joint chairman of parent company Compass Holding BV of the Netherlands. For instance, he said, "five people may report to Jones, but 2.2 of them may have nothing to do with Jones. We want to know what people do, not to whom they report."

Clients gather the data themselves, using Compass software. That way, said Blitz, "they feel responsible for the data. They know we didn't get the wrong stuff."

Data is validated and analyzed. The findings make up a numeric report that examines unit costs for services, quality of services delivered, personnel productivity in each function, level of automation, hardware use, software use—all in comparison with the reference group.

Compass's reference group is one area in which it differs from competitors. Other services use averages derived from largely American databases to compare clients against companies in similar industries and with similar data-center structures. But according to Blitz, when companies are compared to a database average, "half perform better and

ILLUSTRATION BY ALAN MAZZETTI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Comparative analysis breaks down the costs of certain components of the IS operation and shows how they stack up against the competition, highlighting areas that could stand improvement.

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half worse. Those who perform better have no incentive to improve." It also makes sense to use a cross-industry sampling, he said, because "to the operator mounting papers into a laser printer, it doesn't matter if the papers are bank statements or insurance claim statements."

Compass—whose parent corporation claims a 70 percent share in the Scandinavian market and has made recent inroads into Europe and Great Britain—is unique in using an international database. "People don't cost the same amount in different countries, but if they operate machinery it takes a certain time to do certain functions. The same goes for hardware," said Blitz.

"It's a very real-world target," said John Thomas, vice president of marketing. "We're trying to alert companies that they're in world competition and they should be striving to be the best."

Clients agree. "The way they compare the basic environment should be similar across all companies," regardless of location or industry, said Lee Peterson, manager for MIS administration at The Brown Group Inc., of St. Louis, a $1.8 billion shoe manufacturer.

The analysis Compass performed for Brown "is going to have significant impact on next year's budget," said Peterson. "It may pay for itself several times over in the first year. We've already plugged [a repeat analysis] into next year's budget."

That's typical. More than 90 percent of Compass customers sign on for annual analyses, which average about $50,000 for a data center, $95,000 for a network.

Providers of comparative analysis services base their analyses on different criteria. The methodology used by Real Decisions Corp. of Darien, Conn., for example, "is very similar to what an outsourcer does," said Leonard P. Bergstrom, executive vice president. "We look at the costs involved, the performance expectations of the organization and the facility overall—what they're producing on an overall basis."

Real Decisions compares clients to companies within the same industry and with the same IS structure. "We've got 150 companies, mostly North American, in [our] database," Bergstrom said. "People want comparisons with a true peer group." Moreover, he pointed out, "cost structures differ among countries, even between Canada and the U.S. You can't compare U.S. and Canadian networks on a cost basis at all."

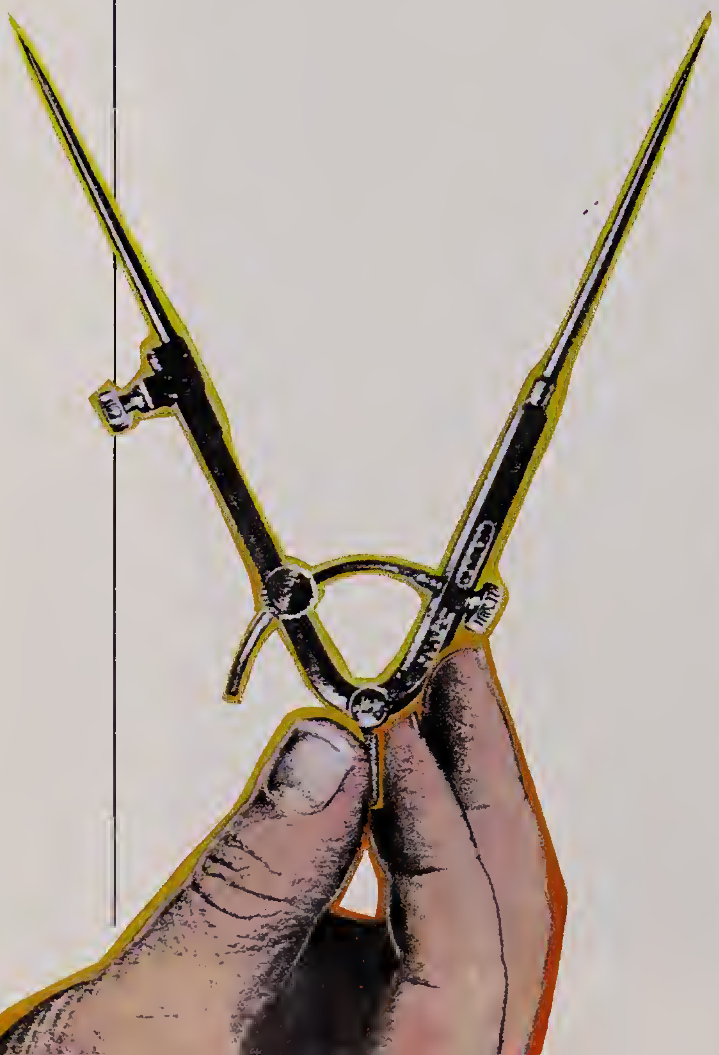
Bergstrom believes that having an industry reference group is crucial. "Some people may say running an efficient data center is running an efficient data center [regardless of industry]. But there are [many] reasons why [this] isn't so. Our clients get to be compared with similar companies in similar industries."

Like most comparative analysis services, Real Decisions puts all clients through a "cost-normalization" process, to be sure it's comparing like things. In other words, while the same budget line item may mean different things in different companies, cost-normalization determines what they really are and fits them into a common budget structure.

After clients collect the basic data, Real Decisions runs cost-efficiency and service-level benchmarks. "We get on the system and run the benchmarks ourselves," said Bergstrom. An online service-level monitor operates like an automatic user, running IMS transactions over a month to show where bottlenecks occur. "We really concentrate on that magic price/performance indicator," Bergstrom said. "Somebody's cost performance may not be as good as somebody else's, but they may be paying overhead for sub-second response time. They'll never be as cost-efficient, but they deliver a higher service level.

"We also look at the overall workload: what the center is producing. A center with very diversified services is much more difficult to optimize because of the wide range of requirements."

The analysis results in a "normalized weighted index" that is used to determine whether an average data center in the database would run the



client's workload more or less efficiently than the client does. "Then we have a subset of comparisons based on size, industry, country," Bergstrom said.

Real Decisions also offers network and application development analyses. And they "have an outsourcing model that shows how well you would perform versus an outsourcer," said Richard Morrison, senior executive vice president at Shearson Lehman Brothers Inc., a Real Decisions client. "It gives you a fair indication whether you should have some outsourcing done or, conversely, whether you should think about [acting as an outsourcer yourself]."

A typical core data-center cost analysis runs about $25,000. Adding the service-level analysis, which relates performance to cost, runs an additional $10,000 or so. More than 90 percent of Real Decisions' clients re-signed last year.

Several of the Big Six accounting firms offer similar services, usually within the framework of more traditional management consulting. Most notable is Nolan Norton & Co., an information technology firm of KPMG Peat Marwick based in Lexington, Mass., which has been performing comparative analyses since 1980.

"It's called a baselining process," said Jules Ghedina, principal in the Technology Resource Center of KPMG Peat Marwick in Montvale, N.J., which acts as a support function and offers services and products to all of the firm's management consultants. "We do the entire MIS oper-

> *"It's a very real-world target. We're trying to alert companies that they're in world competition and they should be striving to be the best."*
>
> *–John Thomas*

A Note of Caution

At least one industry watcher believes that comparative analysis of IS operations measures the wrong things

Measure, quantify, compare, analyze. These words have a strong allure, especially for CIOs. But there is at least one voice crying out in the IS wilderness with the message, "Let's not get carried away."

Before a company undertakes a comparative analysis of its IS operations, it should have a clear understanding of what it will *not* measure, according to Howard Anderson, managing director of the Yankee Group Inc., a Boston consulting firm. "The problem with Real Decisions, Nolan Norton and Compass [see main story] is not that they're inaccurate," said Anderson. "Their measurements aren't false, but they're wrong. They give clients a false sense of security. How come every company I visit tells me they're in the top 5 percent? Where do they find the other 95 percent? Haiti? They can't all be best."

Anderson said the analyzers and those who hire them can't see the truth for the facts. "We're measuring ourselves on the wrong functions," he insisted. "For example, we're measuring uptime. It's like saying, 'Our fans run 99 percent of the time.' But it's winter. We're measuring the wrong thing, then saying, 'Look how well I'm doing.' "

For instance, Anderson explained, a company might consider outsourcing its payroll function and downsizing its data-processing department. On the other hand, he said, "if I'm doing payroll, I'm going to look like a very efficient user [compared to others]. They're measuring the wrong thing." If anything, Anderson argued, such analysis would be more apt to discourage the re-engineering and restructuring that "smart companies" are currently undertaking. "[Clients] say, 'How can you propose restructuring? Look at how efficient we are!' "

The real issue is not cycle response, Anderson said, but "the role of IS in the '90s. They should survey the lines of business and ask, 'Are you happy with application development, with bill costing? Are we performing for you?' Instead they show management how well they're running the engine room on the Titanic. Management says, 'If you're doing so well, how come I'm doing so poorly?' "

This type of justification is "not playing well in corporate America anymore," Anderson claimed. "There is value [in comparative analysis], but it's not a measure of IS effectiveness. All you measure is [whether] you're running machines efficiently.

"What they're measuring is 10 years out-of-date," he concluded, "but they'll measure the piss out of it."

—K. Melymuka

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> *"We found a statistical curve—the norm—and you can position yourself against the norm. If you're above it, it shows the potential for savings. If you're below it, it tells you how good you are or how lean you are."*
>
> *–David McKay*

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ation and all of the business technology. We also have a service from a data-center perspective. We look at the technology overall in the firm and use discrete points for comparative analysis within the client's industry and within [companies] with that type of MIS organization."

Moreover, Ghedina said, while "clients want to know how they're doing in their industry, . . . some may have different configurations, so we also compare them within the same MIS configuration."

David McKay, director of the Nolan Norton Global Institute, explained, "We found that if we look at workloads in a data center, there's a strong correlation to the amount of resources you require. For any given workload, you could correlate head counts and dollars spent. These things are commonly understood at the executive level." He added that other kinds of analysis often are couched in terms too technical to be helpful in the executive suite.

"We have a database of 250 sites in the U.S., Canada and Europe," McKay continued. "We found a statistical curve—the norm—and you can position yourself against the norm. If you're above it, it shows the potential for savings. If you're below it, it tells you how good you are or how lean you are."

Nolan Norton's analysis evaluates spending on hardware, software, personnel, space and so forth in functional areas to derive the fundamental drivers of cost in the data center and the network. The data-center analysis is often part of a larger study of corporate information systems. That was the case when Nolan Norton did a baseline study for SKF Bearing Industries Inc. of King of Prussia, Penn., in 1989. "The data-center analysis was really a spin-off of an assessment of the entire IS area," said SKF IS director Mitch Chaney.

But even in a straight data-center baseline study, Nolan Norton takes a more strategic view. "We are looking at efficiency and effectiveness—how well you're providing services like response-time," said Michael Connolly, senior manager of the Nolan Norton Global Institute. "We also include the technical quality of applications, the skills and experience of people in the data center and the management practices."

Nolan Norton's assessments are based not just on facts and figures but on interviews and other subjective criteria as well. "Because we do quantitative and qualitative analysis, we're able to provide a value-added assessment of the real things you've got to do," McKay said.

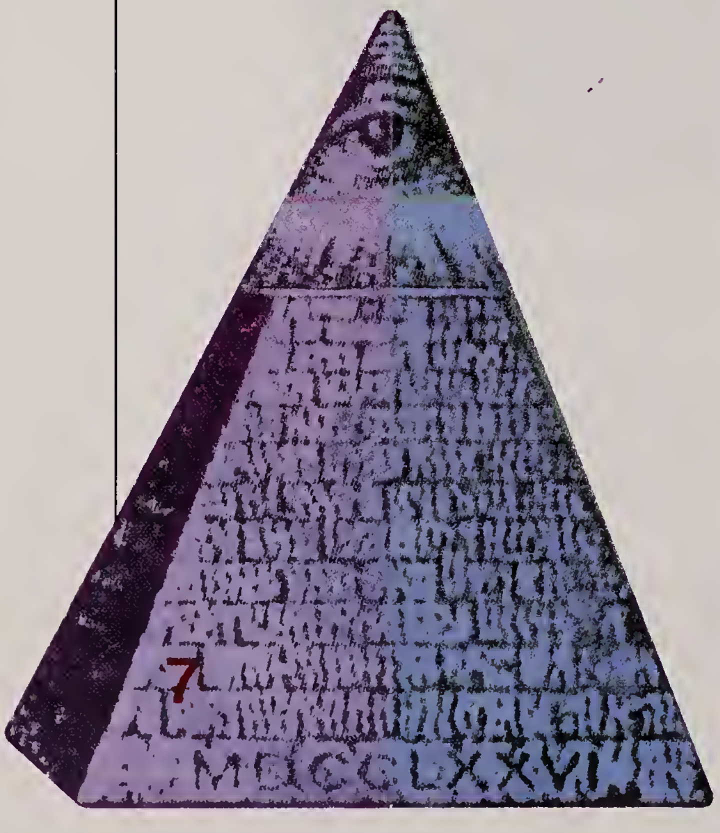
"I find Nolan Norton to be objective and subjective," said SKF's Chaney. "They're objective in terms of the measurements. They have a very structured, set way of proceeding and a set number of things to measure and compare to norms. But they're going to interpret them for you subjectively. That's where all the fun is. We felt the Nolan Norton methodology fit us the best."

Finally, McKay said, Nolan Norton reports are based on issues and framed in language executives understand. One such issue is outsourcing. "The whole philosophy [of outsourcing] is profiting from your inability to manage efficiently," he said. "If you're really efficient, [an outsourcer] won't touch you. They're going after the money associated with your inability to manage, and they'll give some of that back to you.

"Clients ask us, 'How much can I save if I do this myself?' and I can tell them," McKay continued. "That way, even if they go with outsourcing, they know how big the pot of gold is. They can go back to [the outsourcer] and negotiate based on that."

There are nuances among these and other comparative analysis services that make one or the other more attractive to a given client. But all offer the same basic service: to objectively quantify and compare costs. Compass's Blitz summed up the appeal of comparative analysis: "Finally," he said, "someone [is] discussing facts rather than religion." CIO

Kathleen Melymuka is a freelance writer based in Duxbury, Mass.



Without a computer, finding the two that match could be murder.

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Police work isn't the only line of work that can benefit from the harnessing of computers to images. As Forbes pointed out in its November 26th cover story, oceanographers used this computer imaging technology to turn a warehouseful of data into a couple of file cabinets. One law firm used it to scan 325,000 pages of documents—a search that would have kept 100 paralegals busy day and night for four months.

The applications for computer imaging systems are so dazzling that one day nearly every office worker could be connected to or near one. What all this means to a sluggish computer industry is growth. The kind of growth that will propel it into the year 2000, and beyond. The Forbes article contradicts Wall Street's conclusion that computers are just another cyclical capital goods industry.

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Managing the Managers

If IS hopes to triumph in the battle of the budget, it must start by winning over top executives

BY MIKE HALE

Winning over senior management to IS concerns is like conducting a successful revolution: It depends almost exclusively on changing basic attitudes. As executive administrator of the Information Resource Commission (IRC) for the State of Florida (sometimes referred to as the CIO), I'm a kind of Paul Revere for the state. More and more I find myself riding from agency to agency alerting our executives that information management is coming. Some jump out of bed and prepare for action. Others have been awake at their posts for years. Still others get up slowly, stare at me with a puzzled look and say, "Mike, what's the problem? Why all the rush?"

In 1983 the Florida Legislature realized that the state was concentrating too much on buying computers and not enough on managing technology to help meet program objectives. To correct this problem it adopted a concept of information resource management (IRM) with a major concentration on early planning rather than on purchasing approvals.

The goal was to reward good planning with expedited procurement. By all measures this strategy has been working, albeit with some pain and setbacks. However, the Legislature did not guarantee funding, and there were no assurances that line managers would make IT a top priority.

The State of Florida spends over $400 million annually on IT, out of a total budget of $27.4 billion. Although that is a large number, it is not enough for development of many of the strategic applications of technology that could significantly improve program performance.

Why doesn't IT get more money? Because every other resource manager is also competing for an ever-shrinking tax dollar. And it is going to get rougher: Florida's revenue shortfall is projected at $772 million for the end of this fiscal year. What follows are some of the ways that we in the IRC are attempting to meet these challenges and win a greater share of the budget for IT.

Funding for most government programs is justified by traditional cost-benefit analysis. The benefit side of the equation is usually measured by efficiency considerations such as reducing backlog or meeting future workload demands. Since managers seldom have the opportunity to reengineer their processes prior to introducing automation, IS budget issues are most often viewed in light of making existing processes more efficient, not as changing the fundamental way we do business.

Two things will help change this: declining revenues and explosive growth. Florida is one of the fastest growing states, and existing pro-

ILLUSTRATION BY LINDA BLECK

cesses are not going to meet demand without re-engineering and maximum leveraging of automation. It will not be sufficient to simply automate yesterday's processes. At the same time, limited dollars are going to force staff reductions in labor-intensive operations, with a corresponding increase in reliance on automation. Our challenge is to enable fundamental change to occur before serious problems are encountered.

As long as traditional methods of efficiency-based budget analysis prevail, budgets will probably remain at current levels. Moreover, budget analysts will not be the principal agents for change, because they are only expected to follow the guidance of top executives. So any revision of budgetary priorities must begin at the top: Change the boss's attitude toward IT and you change the analyst's.

Educating executives about IT is a prerequisite for changing their attitudes. Differences in organizational structure and language and rapid advancements in technology are obstacles to communication between top managers and IS professionals. Consequently, executive education programs, seminars and meetings with IS experts are vital. In recognition of this, our State Strategic Plan sets forth a policy guideline for providing top executives with the skills and knowledge necessary to strategically use IT to improve services to the public.

Sometimes, however, a top manager may defer to a trusted consultant's advice on investments. It is important that this consultant be made known to the organization and accessible to IS staff, so their time and energy is spent justifying additional resources to the correct person.

We have also found that it is important for the IS manager to accurately convey to top management whether the organization is ready for greater investments. Often top managers have a strong desire to introduce technology but believe that their organization is not adequately prepared. One of the biggest mistakes IS managers can make is to risk their own credibility by urging major investments before the time is right.

It is important to ensure that the organization has a practical (preferably fully structured) planning methodology, beginning with a strategic business plan. No single factor does more to ensure the transformation of an organization or bond the IS staff to the boss.

In addition, we have found it helpful to keep a variety of activities—such as pilot projects, demonstrations and hands-on exhibits—going on all the time. The synergy from such a broad-based set of projects is enormous. One feature of one project may give special insight into a second issue coming up for consideration for funding. One example of this synergy is the evolution of our statewide data network. Having management commitment to consolidating the separate data networks in our criminal justice agency was a strong stimulus to accelerate the planning and implementation of our statewide data network utility.

State IS executives need to develop accurate, well-defined promotional programs to sell IT to top management. IS professionals have been brought up in a culture of precision and no-fault performance and taught not to make bold promises. These are outstanding traits, but they may prevent CIOs from delivering a convincing message in a timely fashion. Top managers need to be exposed to a convincing message all day, every day, if a true transformation is to occur. The danger is that the IS executive will set unrealistic expectations or make promises and not deliver. This danger notwithstanding, IS managers must be more aggressive in promotion.

As we encourage our top managers to create information-based organizations, there is no substitute for role models. Almost every category of IRM lends itself to leadership-by-example: training programs, quality of plans, commitment to structured development methodologies, pilot programs exploring alternative technologies—the list goes on.

At a meeting of the National Association of State Information Resource Executives in Tallahassee, Fla., Jack Rockart, director of the Center for Information Systems Research at MIT, encouraged line managers to assume more of an ownership attitude toward information management and avoid deferring to technical staff on matters of importance. In government it is the bureau chief and division director who should take more of a leadership role in planning, application development, systems implementation, training and security, and use the data center as supporting resources. Then as budget issues come up through the ranks, they may have the enthusiastic support of top management.

> *The goal was to reward good planning with expedited procurement.*

CIOs can consider it a major achievement when they have top executives so convinced of the merits of an information-based organization that they announce a policy of pursuing productivity through automation. This alters the mind-set throughout the organization and changes the fundamental question from "whether to invest" to "when to invest." In Florida, we hope to convince our legislators to invest a much greater portion of the budget in IT. We feel we can justify up to a 50 percent increase: $175 million to $200 million per year. Any increases would be targeted primarily at strategic applications, but some would be invested in raising the productivity of the knowledge worker, improving the statewide infrastructure and replacing older administrative systems. The good news is that we are seeing champions of IT elected and appointed to positions of top leadership; people who appreciate the potential of IT understand what is involved and are willing to make the necessary sacrifices. Practically speaking, however, these champions probably also realize there is no alternative.

Mike Hale is executive administrator of the Information Resource Commission for the State of Florida.

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A Floppy for the Teacher

Interactive video systems are adding a new twist to training: Employees learn more for less, and enjoy themselves in the process.

BY ROCKLEY L. MILLER

Ignorance is pervasive in our workforce. It is not limited to the obvious cases of actual illiteracy, but rather refers to any lack of skills or information that prevents an employee from performing his or her work in an effective and efficient manner.

Ignorance is no respecter of position or function. It can be just as destructive in the boardroom as in the mail room, in the cafeteria line as on the assembly line. CIOs who have been drafted to fight the war against ignorance may wish to take their lead from the military and use the best weapons at their disposal.

The U.S. military for years has pioneered the use of interactive video systems to support its training and information requirements. Interactive video systems typically consist of a computer, laser videodisc player, monitor, and pointing device such as a light pen, mouse or touch screen. With more than 20,000 such systems in use and over 12 years of experience, the military has reaped numerous benefits by turning these "laser-guided" weapons against its training problems. The technology is an invaluable component of tabletop tank gunnery trainers, equipment maintenance simulators, logistic mapping systems and aerial refueling trainers, among others. Unlike most military "weapons," however, interactive video systems have proven equally successful in corporate and education environments.

ILLUSTRATION BY VICTORIA KANN

Reduced Learning Time

Interactive video systems excel over traditional modes of instruction in numerous ways. For one thing, interactive technologies reduce learning time by an average of 31 percent, according to a recent report, "Effectiveness and Cost of Interactive Videodisc Instruction in Defense Training and Education," by J. Dexter Fletcher of the Institute for Defense Analyses in Alexandria, Va. The report, which analyzed 47 studies from the military, education and private business, attributed the improvement to several factors.

- Self-paced instruction encourages learners to take the most efficient path to mastering material.
- Interactive instruction allows learners to skip areas of strength while investing more time in areas of weakness.
- The combination of visual presentation with audio explanation delivers information in an easily understood format.
- Interaction and instant feedback provide constant, highly effective reinforcement of concepts and content.
- Personalized instruction accommodates different learning styles to

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Examples abound. One interactive video-based course, IBM Principles of the Alphabet Literacy System, has produced two years' worth of improvements in reading and writing skills in just 100 hours of instruction. Xerox Corp. has reduced training time by 15 to 30 percent since it began installing videodisc training systems in 1984, and has since expanded its training network to include nearly 1,000 systems nationwide. Massachusetts Mutual Life Insurance of Springfield, Mass., reported an average 30 percent decrease in training time requirements and a 10 to 15 percent increase in first-year agent earnings using interactive training.

Reduced Cost

In a corporate environment, reduced training time translates directly into reduced costs. The distributed training approach enabled by interactive technologies produces further savings by eliminating the need for travel and hotel accommodations for trainees.

The primary costs of interactive instruction are design and production rather than replication, distribution and delivery. Thus, the cost per student declines as more students use the same program. A typical cost-per-student break-even point for custom interactive instruction might occur when from 100 to 200 students are using a program: For off-the-shelf programs that point is usually fewer than 10. Beyond those numbers, savings build dramatically.

Federal Express, headquartered in Memphis, Tenn., expects to save over $100 million by using interactive systems for employee training. British Telecom saved $2.8 million by replacing a three-day lecture-based course with an interactive videodisc course. At Xerox, "a single day saved in technical training [across the organization] translates to $2 million at the bottom line," said Bob Deroller, consultant and program director.

Frequently overlooked and underestimated is the opportunity cost of having an employee out of action during training (usually $400 a day or more). Reducing training time through technology puts employees back to work sooner.

According to Jerry Steele, manager of Education Technology at the Ford Motor Co. in Dearborn, Mich., "The monetary value of the time spent by learners usually makes up the largest part of training costs—typically 80 percent." Ford has reduced training time by 40 percent with the self-paced learning capabilities of computer-based training and interactive technologies. For this reason, Steele said, Ford is shifting rapidly from traditional training methods to technology-based programs for its 360,000 employees worldwide. He expects that within three years, 50 percent of all training will be technology-based using CBT, interactive audio and interactive video.

> *Interactive systems can be used cost-effectively to simulate laboratory or operational equipment that would typically be too expensive to use in training.*

Interactive systems can also be used cost-effectively to simulate laboratory or operational equipment that would typically be too expensive for training. A basic chemistry laboratory course using interactive video allows students to explore such areas as gas spectrography by employing simulations of equipment that would cost tens of thousands of dollars.

The military has employed the technique in a similar fashion and achieved even greater savings. For example, the Army used switchboards that hook into a major communication system for training its maintenance crews. More than 30 switchboards would be needed to provide sufficient hands-on training, and each switchboard costs several million dollars. By using interactive video-based simulators instead, the Army is able to deploy the real switchboards back to their intended purpose and achieve substantial savings. Tank gunnery training systems provide another example. Although these systems typically cost about $15,000 apiece, they pay for themselves almost daily by eliminating the use of high-priced ammunition.

Consistency of Instruction

Technology-based instruction also excels over other techniques in its consistency and reliability. Unlike human instructors, interactive systems do not get tired or have bad days. The quality of instruction does not vary from class to class, location to location or trainer to trainer. An organization that has invested at the front end in designing a course for optimal learning should have a reliable, consistent delivery platform to back it up. Such consistency also facilitates measuring results and fine-tuning information delivery.

Another benefit of these one-on-one systems is privacy. Learners feel free to ask questions and explore areas that might cause embarrassment or breach a confidence in group situations. Also, because instructional systems never lose patience, they encourage learners to persist in asking questions and reviewing materials until real mastery is achieved or natural curiosity satisfied.

Training isn't the only area where privacy is desirable: Some businesses are using interactive systems to help resolve a variety of human resource issues. For example, agents at Massachusetts Mutual rehearse their sales-pitch performance reviews with an interactive system before sitting down with their manager. At other companies, employees use the technology to review benefits plans, entering their own personal data and making financial calculations in private.

Traditional classroom instruction cannot pace itself to the individual. Learners using interactive systems, however, can master a subject before moving on, thus ensuring a strong foundation for continued learning. For example, at-risk students in Everett, Wash., improved their mathematics test scores by 53 points using interactive instruction from

Systems Impact of Gaithersburg, Md. Test scores for remedial and Chapter 1 students in Bethel Park, Pa., improved by 300 percent using the same program.

"The dominant concern of educational reform should be in continuous, lifelong learning delivered on demand, in time, and online via interactive, multimedia expert systems," according to James Dezell, vice president and general manager for Educational Systems at IBM Corp. Dezell also observed that the long-term savings from such an investment counter arguments about cost. "We currently spend $210 billion on K-12 education; 25 to 33 percent of that is spent on remediation. Industry spends a further $30 billion to $40 billion. More effective technology-based learning could save $100 billion per annum, just on remediation."

In the commercial and military sectors, mastering material takes on a whole new importance. In many situations, less than 100 percent competence is unacceptable. Lives depend on the expertise of air traffic controllers, pilots, medics and numerous other professionals whose mastery of their field must be ensured.

Greater Retention

Interactive study can also affect how much material learners retain over time. Applied Learning—Spectrum, of Bedford, Mass., reports that interactive video courses have improved retention by more than 25 percent. And over 1,500 Ford dealerships using interactive video for technical training are finding average gains of 49 percent.

An interactive mechanics-training program developed for Federal Express by Applied Science Associates of Landover, Md., has resulted in a 50 percent improvement in the company's dispatch reliability and a 58 percent reduction in the unnecessary replacement of working modular components, according to Richard Thackray, senior vice president at Applied Science Associates. Projecting these results over five years for 60 percent of its most critical tasks, Federal Express estimated that it would save $50 million in inventory and direct training costs—10 times the company's $5 million investment in development.

Another advantage of interactive systems is that they allow students to explore potentially dangerous subjects without risk. Using an interactive course on basic electronics and maintenance, students can touch the wrong parts without risking electrocution. A defensive driving course allows learners to make some mistakes without paying the consequences in life and limb, and the only explosions encountered by students taking a chemical hazards awareness course at Chrysler Corp. occur on-screen.

> *"The dominant concern of educational reform should be in continuous, lifelong learning delivered on demand, in time and online via interactive, multimedia expert systems."*
>
> *–James Dezell*

Increased Access

Another benefit of interactive systems is the greater, more equal access they provide to quality education, training and information resources. Systems can deliver peripheral subjects at schools where population and/or budget cannot support enough full-time teachers, or where qualified instructors are unavailable. In Minnesota, for example, many high schools lack the staff to offer economics classes, so The Minnesota Educational Computing Consortium has stepped in to fill the void with a videodisc on that subject.

Interactive video also facilitates information delivery to employees wherever and whenever they need it. Chrysler Corp. positioned portable training systems throughout its manufacturing facilities to allow the delivery of information mandated by the Occupational Safety and Health Administration without disrupting the assembly line or requiring overtime attendance at classes. And companies including Ogilvy and Mather and Rockwell International have installed interactive kiosks at strategic corporate locations to provide employees with up-to-date information about corporate news and products.

Finally, interactive video systems are highly effective motivators. They can be so involving and provide so much feedback that students may find it difficult to tear themselves away. In the Army, the success of tank gunnery trainers is practically legendary: The devices were so much fun that recruits actually broke into one of the training centers in order to use them. Furthermore, interactive systems focus the student's attention, reducing the potential for distraction.

IBM's Dezell has observed that motivation is the single most important element in learning. But "in a culture that has evolved through TV, computers and new technologies," he asks, "how do we motivate high-tech kids in a low-tech learning environment?" The answer is plain: by using those same technologies.

Interactive systems allow learners to take greater control and hence responsibility for their own learning process. As they discover new areas of interest and accomplishment, they become seekers of knowledge, not just recipients of instruction. In essence, interactive systems help students learn how to learn—both a skill and an appreciation that will serve them throughout their lives.

Rockley L. Miller is editor and publisher of Multimedia & Videodisc Monitor *in Arlington, Va., and founding president and past chairman of the Interactive Multimedia Association in Washington.*

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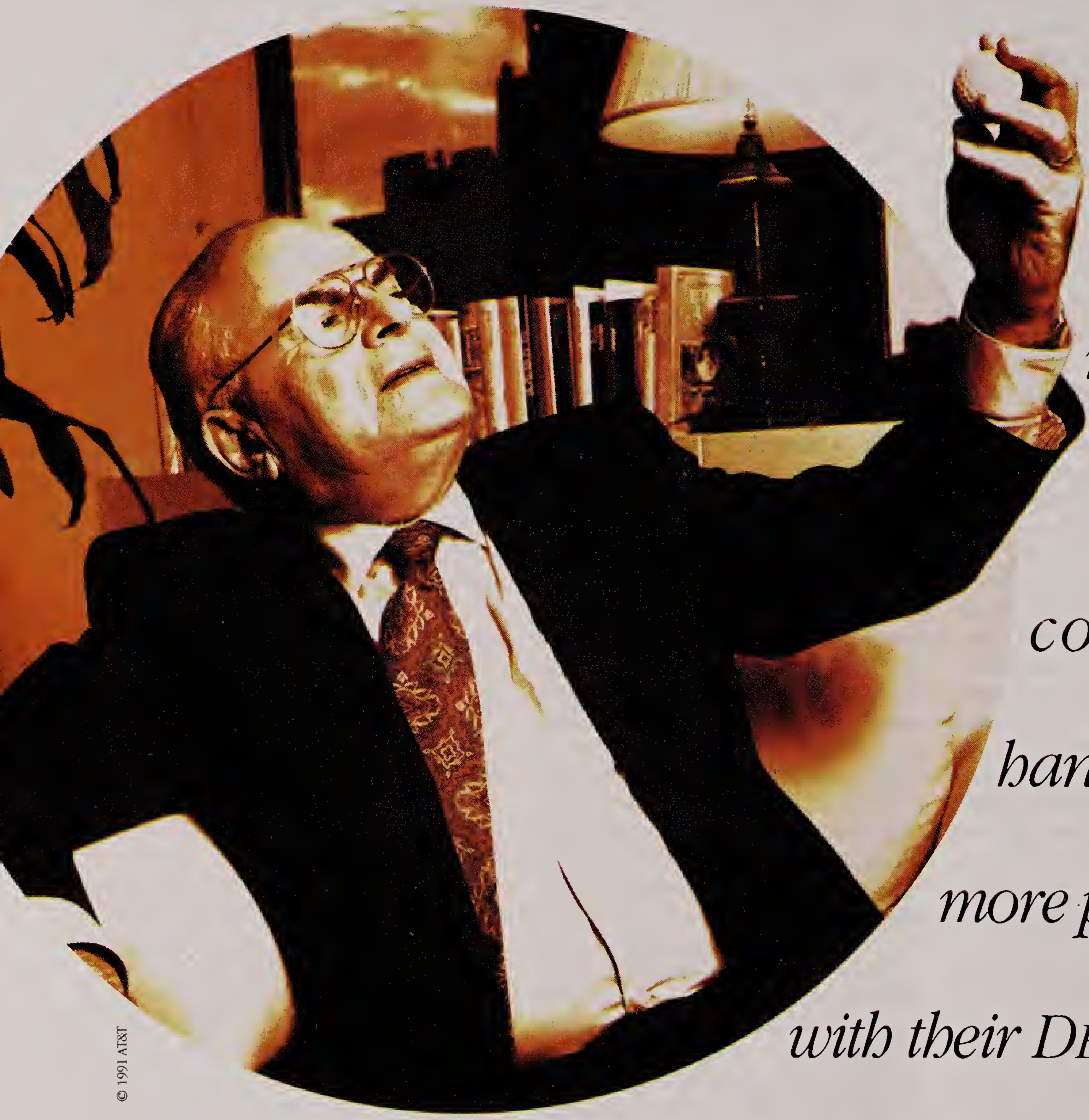

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Brass Tacks

The decks have been cleared. Now what do CIOs *really* want from their software vendors?

BY ALLAN E. ALTER

What is it about the relationship between technology vendors and technology users that dampens the full, free and open exchange of views? Perhaps it's the acute awareness on both sides that although they are mutually dependent, their agendas are strikingly different. But when users are given the opportunity to question vendors on issues of concern (or irritation) in a way that won't imperil their own organizations' vendor relationships, they are eager to fire away.

So last December *CIO* asked a dozen top information executives to suggest questions to put to five leading software executives, four of whom are the CEOs of their companies: Lotus Development Corp.'s Jim P. Manzi, Microsoft Corp.'s William H. Gates, Computer Associates International Inc.'s Charles B. Wang and Dun & Bradstreet Software's John P. Imlay Jr. The fifth is Richard H. Goldberg, IBM Corp.'s assistant general manager for software marketing.

Software Pricing

Many CIOs want software companies to do away with graduated pricing and to grant multiple site licenses or copy permission. While the latter can often be negotiated, CIOs shouldn't hold their breaths waiting for an end to graduated pricing. Vendors argue that graduated, or tier, pricing is a fair way to set software fees. As IBM's Goldberg put it, graduated pricing "prices to value," so that the bigger the hardware platform, the more valuable the software is to the user company.

But most vendors hastened to say that they offer some flexibility. D&B Software offers less-costly versions of its software for small companies that are willing to give up some functions to save money. IBM offers "distributed software licenses," which charge the full price for the main site and a reduced price for remote sites that require less than full functionality. Microsoft offers discounts on software delivered electronically, without disks or documentation.

Imlay, Wang and Goldberg said their customers can negotiate for and obtain permission to copy software; Wang said his customers can also negotiate for multiple site licenses. The word "negotiate" is key; flexibility extends to certain kinds of software and may be granted only if users agree to audit software usage. Lotus, however, has no plans to change its no-site-licenses, no-copy-permission policy. Manzi said he discusses pricing policies with customers, but "the issue of 'give me a site license' does not come up that often."

Application Software

Many CIOs complained that software vendors still lag behind their hardware counterparts in creating new products. They wanted to know what software vendors were doing to get products to the market more quickly. Several cited a lack of application software for Unix and for IBM's ESA environment. But software vendors do not necessarily agree that a software gap exists.

IBM's Goldberg concedes there is a gap. He said that application development tools, standards and cooperation among software vendors are helping to close it.

The software gap in Unix, however, appears quite real. Most software vendors offer few Unix products but plan to release more. Lotus now offers a version of 1-2-3 for the System V variant of Unix and has another Unix product in development, said Manzi. CA, said Wang, plans to port

JIM P. MANZI
Lotus Development Corp.

WILLIAM H. GATES
Microsoft Corp.

CHARLES B. WANG
Computer Associates

JOHN P. IMLAY JR.
Dun & Bradstreet Software

RICHARD GOLDBERG
IBM Corp.

its major database products (CA-IDMS and CA-DATACOM) to Unix, and then its application software; the company already has Unix software development tools and graphics programs in its product mix.

IBM offers a Unix version of its CADAM CAD/CAM software for its Unix RISC workstations; beyond that, Goldberg cited continued work on Unix application products by IBM's "business partners"—software companies with formal marketing, product development and customer support alliances with IBM.

"Unix is in our product plans for the future," said Imlay. "There are six or eight [versions of] Unix that are being [widely] used. Until it comes down to a single standard, you won't see it used in the financial and human-resources applications as you do in the educational or engineering environment. When we find where [our customers] are going [with Unix], we'll be there."

One company that is downplaying Unix is Microsoft. When asked about Unix products, Gates said, "Well, who cares? There are hundreds of versions of Unix. It's just an incompatible world."

As for IBM's ESA environment, most software executives promised they will offer software that runs under ESA. Only Wang discussed specific plans: "We exploit ESA with our systems utilities in the VSE world. This was done by modifying these applications to run with Cobol II; we have a product that takes [applications] from Cobol I to Cobol II. As ESA gets more popular, we will translate more of our applications software to Cobol II."

"We run under ESA," said Imlay, "but it's not an issue for our particular kind of software as it may be for a client/server application."

Source Code

Software executives were surprised to hear that some CIOs, including IS heads at smaller companies, asked about obtaining source code in order to customize or modify applications. Gates said that none of his customers has ever made this request. Imlay thinks it's generally counterproductive, since it eliminates one of the advantages of purchasing software—that is, that the vendor maintains and upgrades it. Said Goldberg: "It's not clear to me what they want to do with modifying source code. If you've done a correct job with the interfaces and publishing the interfaces, it ought to be easy [to customize software]."

Neither IBM nor Lotus is willing to release source code. Gates said he would be willing to provide it to customers who ask for it. And while Wang and Imlay said that they do make application software source code available to their customers, they cited restrictions. For instance, D&B Software will not provide source code to third-party contractors, said Imlay, for fear that they would "develop features on our product and sell them, like pilot fish on a shark."

CASE

CIOs are anxious to select the right CASE tools out of all the various technologies, techniques, approaches and products that are now available, and they hoped software vendors would have some suggestions. One CIO posed the question this way: Of which CASE tools would vendors tell CIOs, "Go ahead and invest in it—bet your company on it"?

Few of the vendors were in a mood for betting—either on specific CASE tools or more general approaches. "There is no CASE technology that has that status," said Gates. "CASE is very valid stuff, and there's a lot of good CASE work using graphical interfaces and data dictionaries, but I wouldn't say that any one approach is dominant" or universally applicable.

Only Imlay went out on a limb. He predicted that the survivors will be IBM's CASE partners, such as Andersen Consulting, Bachman Information Systems, Index Technology, KnowledgeWare and Texas Instruments. But not even Goldberg was willing to bet on specific CASE tools or companies, other than IBM's own AD/Cycle systems development approach. AD/Cycle will endure, but the individual tools that fit into that architecture will change as CASE technology advances.

Customer Service

Three CIOs complained about specific vendors' customer service. We heard gripes that Computer Associates' account executives turned over too frequently to provide good service. Wang acknowledged that he has heard "horror stories of clients having five managers in a few days. . . . We did [have] a poor client turnover from one [account manager] to another. Each time the CIO ended up with the frustration of reeducating a new manager." But CA is correcting this, he said. As of April 1990, CA has had formal guidelines for trans-

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ferring clients from one account manager to another. Furthermore, district managers will get to know CA clients much better, because only three account managers will report to each. (Account managers are responsible for 40 accounts apiece.)

One CIO complained that he has seen a deterioration of customer service since IBM inaugurated its business-partner program with software vendors. IBM's representatives had been referring this CIO to software packages rather than directly addressing his needs, he said. Sometimes, he continued, "the software vendor and IBM march to their own drummer and are not being reconciled to the benefit of the customer." Responded Goldberg: "In general, we're getting better grades in being responsive to the customer, [although] we're not satisfied. . . . We are counting on our business partners to give the same [customer] support that we do. We have to continue to work hard with our business partners to make them an integral part of our IBM support structure."

Integration

CIOs brought up the topic of integration more often than any other. They approached the subject from every angle—from integration at the application and database level on up to complete hardware, operating-system and processor independence. It boils down to this: CIOs are frustrated with the limitations of today's systems and want complete integration as soon as possible. And if the vendors can't provide it directly, CIOs want them to at least provide the means necessary for their own IS staff, or someone they bring in, to carry out the work themselves. But to vendors, the concept of complete integration resembles the concept of perfection: It's something you aim for and evolve toward but can never really achieve. As Imlay said, "The ultimate system will never be reached because [new] technology will outrun us." So while CIOs demand integration now, vendors are working on integration strategies that will take years to implement.

CIOs shouldn't hold their breaths waiting for an end to graduated pricing. Vendors argue that graduated, or tier, pricing is a fair way to set software fees.

The Computer Associates strategy is to closely tie its wide-ranging application programs to CA-DATACOM and CA-IDMS, its two major database offerings, and to make these databases hardware independent. CA already offers integration within application product families, said Wang. Some individual applications within these families are already "database driven" through CA-IDMS or CA-DATACOM; some application families, such as Masterpiece, can also operate and share data on several hardware platforms.

In the future, said Wang, CIOs can expect to see CA's database packages become available on a wider range of hardware platforms and operating systems. For instance, CA now offers a version of CA-DATACOM for distributed systems as well as PC and VAX versions of both CA-DATACOM and CA-IDMS. "Those using CA-IDMS/PC are downloading portions of applications built on CA-IDMS for mainframes and putting it on PCs," he said. Unix versions of these database packages will be delivered in mid-1991. Wang also noted that users can use SQL to gain access to CA-DATACOM, and that they will soon be able to do the same with CA-IDMS.

Like CA, D&B Software has inherited tightly integrated product suites from its corporate predecessors and is attempting to integrate its entire product line. Currently, data can be transferred from a McCormack & Dodge-developed application to an MSA-developed application, but it will not automatically update that MSA application. D&B's short-term corporate integration strategy is to build a common front end so data can easily be drawn from both sets of applications and look the same on the screen. By 1994, Imlay hopes D&B Software's long-term strategy will be in place: full integration of both product lines under a client/server architecture. "Ninety percent of the computing is now done in the host," he said. "In a few years 90 percent will be on the desk. Our software will be able to be ported from host to mainframe to workstation without regard to the number or name on that workstation." Imlay noted that D&B will comply with both IBM's SAA, which he expects will slowly develop as a standard, and open systems standards.

Lotus, said Manzi, offers application integration across hardware platforms. "One-two-three is running on everything from PCs to 3090 mainframes," he said. "All [versions of 1-2-3] can swap data and programs." In addition, Lotus has "built tight links between [our] spreadsheet and graphics products, so we have made . . . generating graphics off spreadsheets as easy as possible."

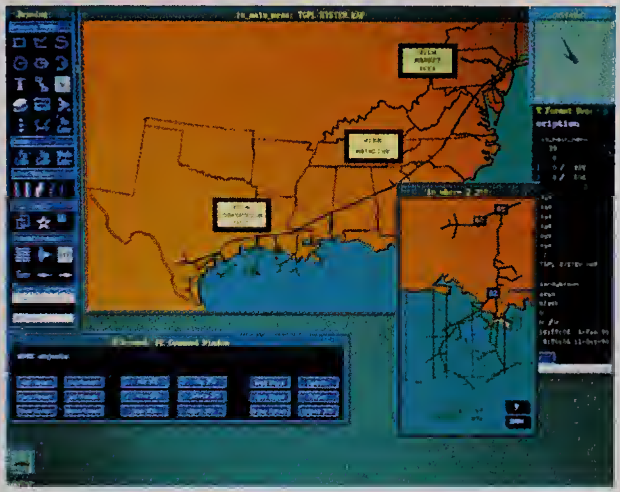
Manzi cited several future steps toward integration, including the DataLens Developer Toolkit that will link 1-2-3 to remote data sources and databases from other vendors. He also cited a new release of Lotus Notes, a workgroup product. This release will allow users anywhere on a global network to share and update compound documents that include spreadsheets, graphs and text.

To Goldberg, integration includes operating in multivendor environments with a common interface, sharing data and resources and porting applications without any rewriting. "When you get finished with all that, customers call it, 'I need an open system,' " he said. He went on to address integration from several angles: supporting OSI standards through the release of OSI networking products (and including OSI standards in both IBM's SAA and AIX [Unix] environments), creating links between the SAA and AIX worlds, and building several "frameworks" that allow the coordination of products from outside vendors and IBM's product line, such as the AD/Cycle software development framework. CIO

FYI

Do-It-Yourself

When it comes to graphical user interfaces, what end users see is invariably what they get—unless they happen to have the time and programming skills to rewrite source code. Now, with the introduction of the first graphical user environment (GUE), even the most casual user can develop and customize graphical displays.



Developed by Kinesix of Houston, the Sammi development tool has real-time and multiple database retrieval capabilities and allows users to interactively present, organize, manipulate and interpret information from multiple applications and across diverse software and hardware platforms. Unlike GUIs, which are embedded in an application's code, Sammi runs as a task independent of the network, enabling users to quickly change the look and feel of an application.

Depending on configuration, initial development copies range from $12,500 to $25,000. For more information, call 713 953-8300.

Getting the Message

"Only connect!" was author E.M. Forster's message to mankind. VMX Inc., of San Jose, Calif., is offering a new platform that helps people do just that by integrating voice messaging, call processing, interactive voice response and local and host database interaction, and will enable the future integration of electronic mail and fax. The VMX 300 supports 200 to 2,000 users, expands from four to 32 ports and offers up to 350 hours of voice storage in a single cabinet.

The 300 can operate as a single system integrated with a PBX or Centrex telephone system, or it can be linked to other VMX systems to develop a multilocation, company-wide communications system. Call and message processing options include Personal Assistance, which automatically transfers callers to another extension and informs the designated assistant who the call was originally for and why it was transferred; and first-in, first-out queuing, which allows multiple callers to hold for the next available operator.

Prices range from $50,000 to $395,000, depending on number of ports and software options. For more information call 408 441-1166.

Keeps on Ticking

Stratus Computer Inc., a supplier of fault-tolerant computer systems, has joined the RISC crowd. Its new XA/R Model 20 midrange machine runs on a 40 MIPS i860 RISC (reduced instruction set computing) microprocessor from Intel Corp. and offers the same design features found in Stratus Computer's XA 2000 Continuous Processing Systems—which are based on the Motorola MC68030 microprocessor.

"Fault-tolerant" machines are built to provide continuous service 24 hours a day, without interruption, despite hardware or software failures, upgrades or repairs. The XA/R computer additionally contains a power system that will recover quickly from power failures. The new RISC addition to the Stratus family will run either the company's proprietary VOS operating system or FTX Release 2, a Stratus implementation of Unix 5.4 that is fully compliant with such standards as SVID, POSIX and the X/Open XPG3 specification. Whether running VOS or FTX, the RISC machine is also compliant with the full range of VOS-based XA 2000 systems. Prices for the XA/R begin at $247,000 for FTX-based systems, and $275,000 for VOS-based systems. For more information call 508 460-2000.

A Hand-Held in Every Pocket

Good things often come in small packages, and some just keep on getting better. The new 16-bit hand-held AcuTote 3000 computer from Fujitsu Systems of America is fully PC XT and MS-DOS compatible, enabling companies of all shapes and sizes to automate field operations without having to make a huge investment in software development, training or proprietary hardware.

The new hand-helds are tough, too. Surface mount technology protects the stability of components against severe shock and vibration, and the entire unit is sealed for protection. An intelligent charging system automatically restores the NiCad batteries it employs to their optimum level and protects against overcharging.

AcuTote can be connected via modem or direct link to a host system to upload captured data or accept downloads from the host. It features sculpted key shapes, supports a variety of scanner attachments and offers an adjustable-contrast backlit display.

The unit's base price is $1,995. For more information, call 619 481-4004.

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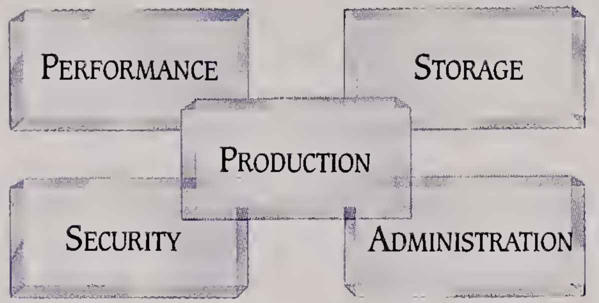

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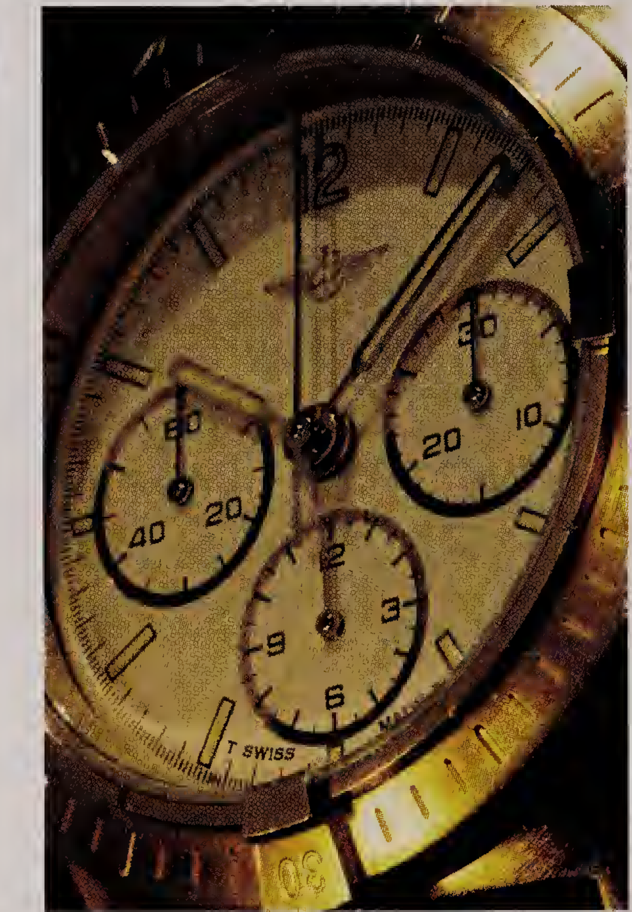

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EVENTS

Database Marketing: New Profit Strategies and Tactics

Hyatt Regency, Chicago
July 9-11
The National Center for Database Marketing Inc.
916 292-3455

This conference concentrates on database marketing tools, vendors, concepts and case studies. Topics of discussion approach ways to capitalize on the economics of enhancing, analyzing and implementing data-driven marketing programs. Consultations, reports, exhibitions, conference workbooks and introductory and advanced sessions are presented. Registration fees: $395-$695.

Total Quality Management Conference and Exposition

Sheraton, Washington
July 15-17
The Society of Manufacturing Engineers
313 271-0777

This conference focuses on ways total quality management can increase customer satisfaction, reduce costs and improve quality and productivity. Included are 21 technical sessions organized around four primary evaluation criteria of the Malcolm Baldrige National Quality Award: leadership/strategic planning, information and analysis/quality assurance of products, human resources and customer satisfaction/quality results. Registration fees: no charge before June 28; $15 after June 28.

Bridging the Gap From IRM Planning to Execution in the '90s

Kona Surf Resort and Country Club, Kailua-Kona, Hawaii
Aug. 5-8
National Association of State Information Resource Executives
606 231-1905

This conference offers sessions on designing the ideal IRM organization, monitoring trends in IRM, conducting an executive training institute, defining the strategic role of the mainframe in the '90s, and information technology and organizational change. Also featured are presentations by winners of the 1991 awards for Outstanding Achievement in the Field of Information Technology. Registration fees: $225-$375.

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CONFERENCE CALL

QUESTION: *How do you reinforce the credibility of the CIO role at your organization?*

The title of CIO may be understood in corporate America, but senior IS executives are still struggling with upper management's lack of understanding of their mission. Like most managers, however, CIOs find that close alignment with the corporate mission and, of course, delivering satisfactory results are the best defense.

Chris Levan

Vice president of information systems for Blue Cross/Blue Shield of Tennessee in Chatanooga

“I think that there is still a credibility problem. We, like most IS shops, have a very large budget. We spend a lot of money, and the results are sometimes intangible. Sometimes we're making investments for the future. I have dedicated dollars and resources toward some long-term systems development activities, . . . and the current level of service is suffering. My [internal] customers can't see the benefits of that today.

“There seems to be a high level of interest among upper management mainly in the amount of money I'm spending. I now have a forum for my peers and executives about once a quarter to explain what we're doing and how it all fits together and what the IS business priorities are. I know from my boss and from his boss what the business priority issues are. That's a major first step here, to be able to show that.

“I think the fact that we're able to dedicate in the neighborhood of 30 to 50 employees to work on some systems of the future, and to have a major commitment in terms of bucks on these systems, [is a positive sign]. Putting some of these deliverables on the table will help to dispel some of the credibility issues.”

Stephen Diamond

Vice president of MIS for The Deltona Corp., a land sales company based in Miami, Fla.

“As CIO, I try to keep management abreast of what we feel the corporation is going to need [to stay technologically competitive]. As long as it can get the results for a relatively low price tag, management is receptive. As long as what we propose is in the best interests of the company, credibility is not a problem.

“We try to get upper management—the department heads, corporate managers—involved in the planning process, and we hope they have enough insight to tell us what they'll need down the road. Most of our senior officers are aware that if you're going to have a sophisticated installation in a mainframe environment, you're going to have to spend the bucks, not only on hardware and software, but on personnel as well. We're in a recession here; we're shorthanded on staff; we're trying to stay focused on what we have to do.

“In my opinion a CIO has to know what he can get out of his resources. You can't oversell what you've got. If you know you have some limitations when you do your three-year plan, you have to bring those limitations to bear. If you don't, they're going to expect the world out of you.

“We've been pretty lucky. The pressure to [overplay our capabilities] isn't there. The departments work with you.

“Some CIOs create their own problems. I think technology is a temptation. Every CIO, I think, wants to have the latest technology at their fingertips. Anybody who has anything on the ball and any kind of initiative would love to have state-of-the-art equipment, but sometimes it's just not feasible.”

James F. More

Director of IS for Jos. A. Bank Clothiers in Owings Mills, Md.

“I think that the credibility between a CIO and an organization is dependent on four things. First of all, the CIO must have an understanding of the corporate goals and objectives and must be in tune to the direction of the company.

“Second is the ability to deliver a product on time, whether it's a new system or whatever. Probably with all the productivity tools out, we do a better job now than we did 10 or 15 years ago. Third, the CIO must ensure that the IS department has the right technology and staff in place to be able to deliver what the company needs.

“Fourth, the CIO must have the ability to react to changes in technology, strategy and direction. We're a vertically integrated company consisting of retailing, manufacturing and mail order, so we've adapted to these different areas with different approaches and roles. The mail order portion knows the business [and IT], so we generally give them what they want. In retailing and manufacturing, we take a more proactive role and let them know which systems or technologies would be the best for them.

“Basically, by being flexible and by adapting to the different needs within the company, the credibility of the CIO and the entire IS department has been enhanced.”

Readers are invited to suggest Conference Call questions. Contact Senior Writer Meghan O'Leary at 800 343-4935, ext. 4733, or by fax at 508 872-0618.

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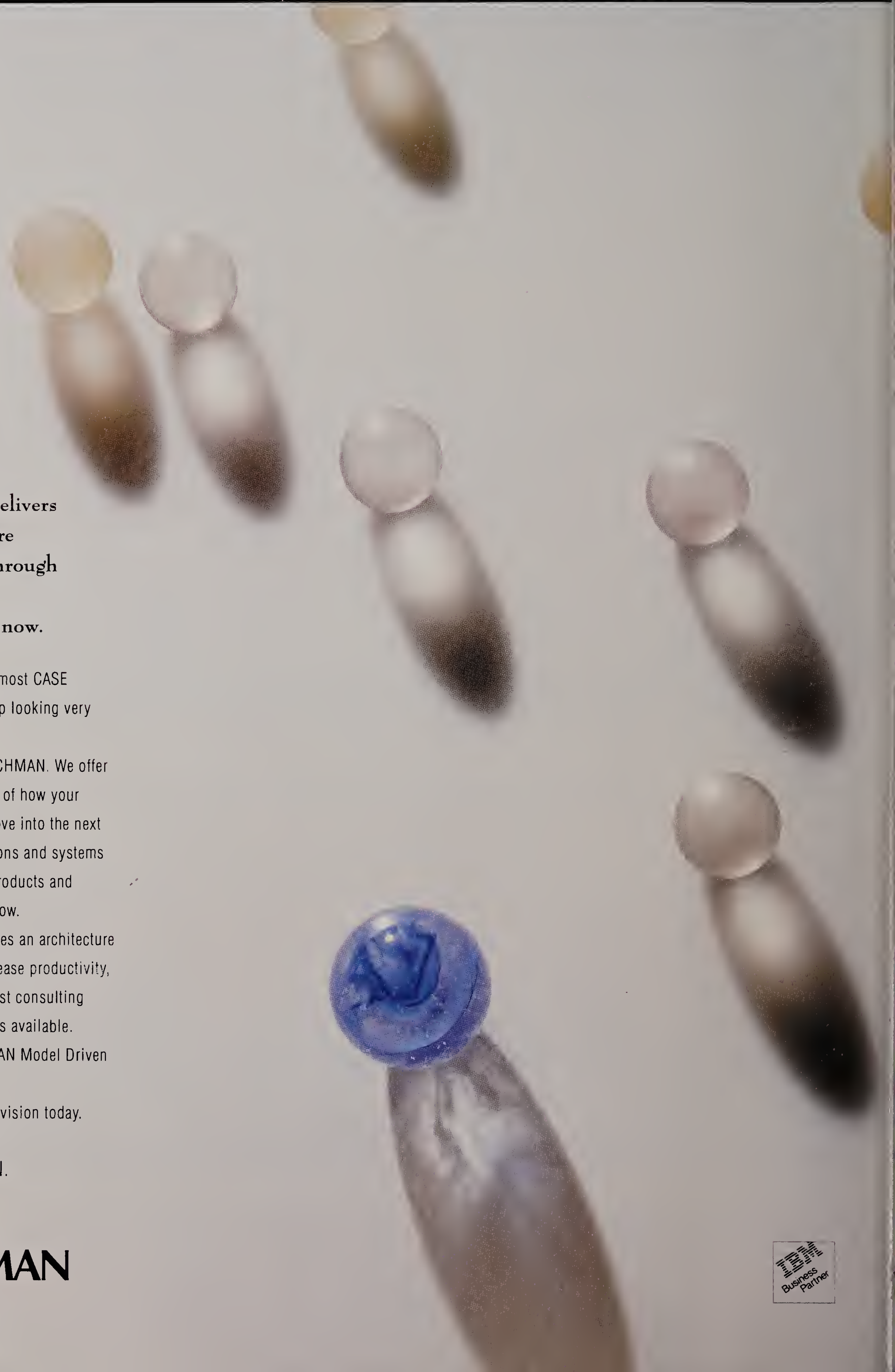

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The Xerox DocuPoll

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1 ***What are the critical issues facing you and your organization in the 1990s?***

2 ***There has been much discussion lately in the trade-press regarding "Re-engineering Work Processes." How has this approach affected your organization?***

3 ***What factors drive the adoption of new technology in your organization?***

4 ***Who (titles) are the primary people responsible for initiating technological change in your organization?***

1

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